Two Sections—Section One
SEPTEMBER 28, 1929

Railway Age

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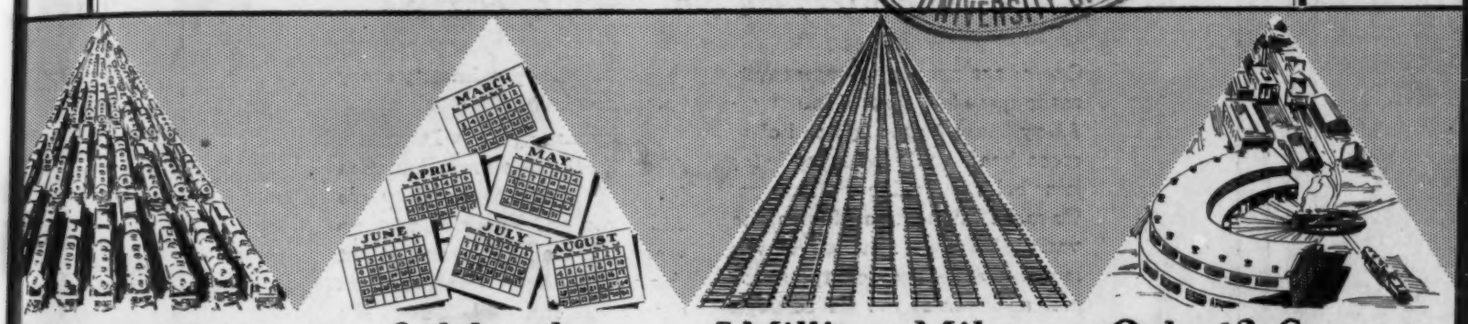

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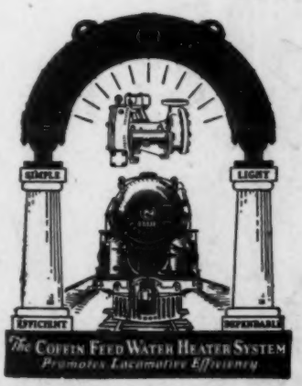

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but show little evidence of wear

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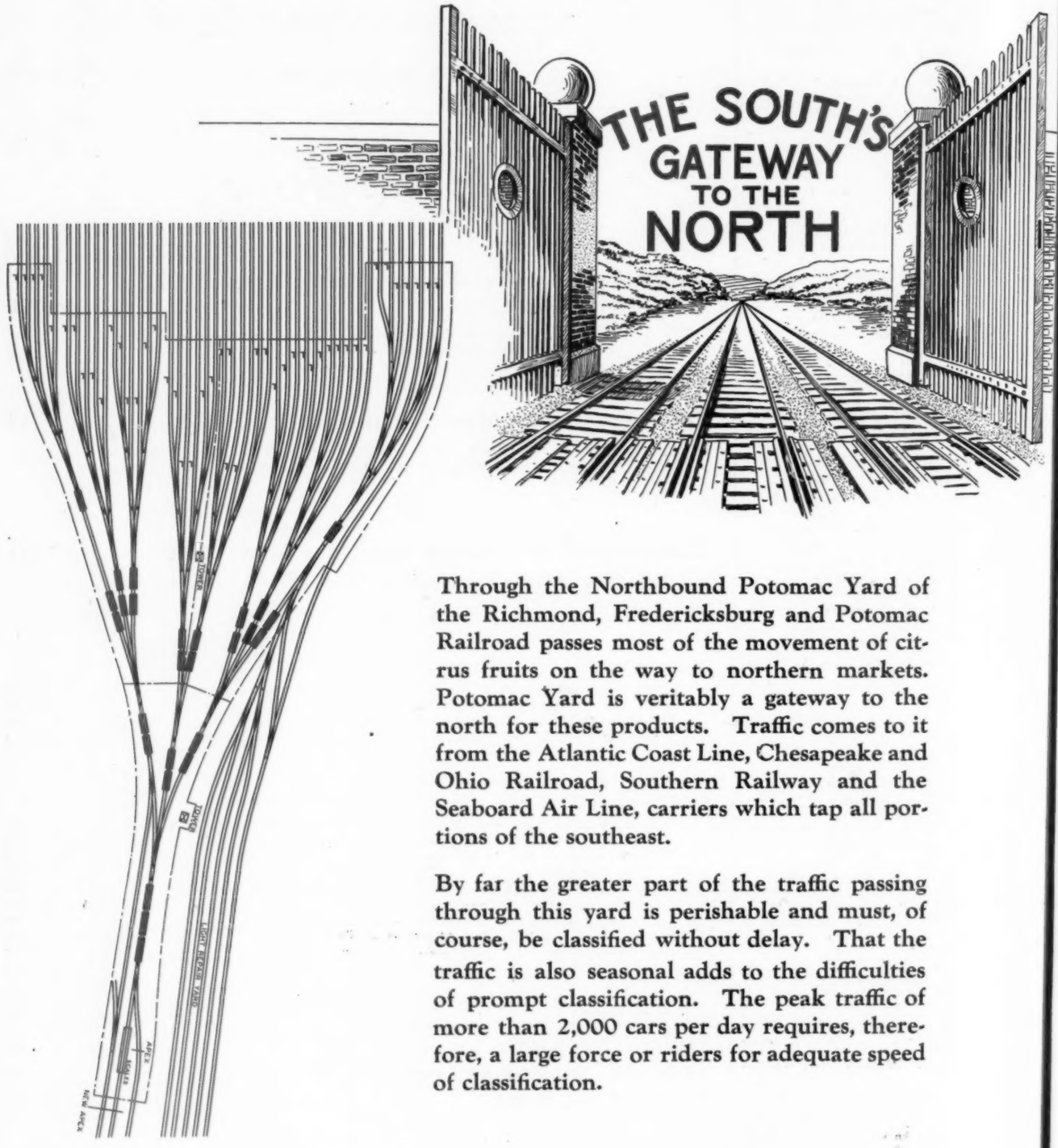
Potomac Yard

Richmond, Fredericksburg & Potomac R R



Through the Northbound Potomac Yard of the Richmond, Fredericksburg and Potomac Railroad passes most of the movement of citrus fruits on the way to northern markets. Potomac Yard is veritably a gateway to the north for these products. Traffic comes to it from the Atlantic Coast Line, Chesapeake and Ohio Railroad, Southern Railway and the Seaboard Air Line, carriers which tap all portions of the southeast.

By far the greater part of the traffic passing through this yard is perishable and must, of course, be classified without delay. That the traffic is also seasonal adds to the difficulties of prompt classification. The peak traffic of more than 2,000 cars per day requires, therefore, a large force or riders for adequate speed of classification.

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Railway Age

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The Consolidator—Friend or Foe?

THE car consolidators or forwarders—organizations which assemble L.C.L. shipments and ship them as carloads—appear to be doing an increasing business. At any rate, one or two of the better-known concerns doing this class of business are reporting earnings considerably greater than those of a year ago. Moreover, the acquisition of control of several forwarding companies by a corporation closely affiliated with one of our large railroad systems is indicative of the growing importance of the consolidator's function in our national transportation scheme.

A full discussion of the situation, it would seem, might be timely and helpful in bringing about a more general understanding of the situation in the light of all its complexities. As a contribution to such a discussion, we propose to outline herein, in tentative form, what seem to us to be some of the obvious difficulties which this development may entail, together with possible means of overcoming these difficulties. We should welcome a discussion of the subject by our readers, understanding fully that as the problem is brought further into the light of day some tentative opinions which we now put forward may require some modification.

Economic Function of Consolidator

What is the economic function of the consolidator? With the spread between the railroad L.C.L. and carload rates as the factual basis for his operations, the consolidator attracts business by offering rates on small shipments slightly lower than railroad rates (or by offering certain services, such as collection and delivery, which the railroads do not). Assembling this business into solid carloads, the consolidator assumes the role of shipper at point of origin and consignee at destination, the railroads collecting from him the regular carload rates. Whatever profit the consolidator makes must come from the difference between the carload rate which he pays and the rate he charges the shipper, which is generally slightly lower than the L.C.L. rate.

Carload business is, of course, easier for the railroads to handle than L.C.L. and a difference in rate is justified. Theoretically the excess of the L.C.L. rate over the carload rate should be just sufficient to overcome the added expense of handling the small lot shipment —the cost of loading and unloading, transfers, added risk of loss and damage and a return on the investment in the facilities necessary to handle L.C.L. business.

The car consolidator in taking L. C. L. shipments has no less to do with them than the railroad would have—that is, he combines them into carloads, ships them to destination and unloads them. How then can the consolidator go to this effort and expense, and perhaps the added expense of collection and delivery, while charging the shipper a rate lower than the railroad rate, and still make a profit?

The answer seems to be in the fact that railroads derive their "fair return" from rates in general. Some of these rates are so low as barely to pay out-of-pocket costs while others are adequately remunerative. The consolidator is not a common carrier. He is able to choose commodities and points of origin and destination where rates are remunerative and leave the burdensome tonnage to the railroads. As objectionable as this practice might be in theory it has not, until recently, been a problem of sufficient importance seriously to affect railway prosperity.

Railroads Losing L. C. L. Tonnage

But what is happening now? The percentage of L.C.L. tonnage to total tonnage originated in the years since federal control has been consecutively (1921-28) 4.5, 4.2, 3.5, 3.4, 3.3, 3.0, 3.0, and 2.9, and this progressive decline has occurred in face of the well-known fact that hand-to-mouth, i.e., small shipment buying has been increasing. The motor truck has undoubtedly influenced this showing. On the other hand, every increase in the consolidator's business must come from traffic which otherwise would have moved by railroad at L.C.L. rates—unless it is attracted from the highways or water lines, and such diversion cannot as yet be an important part of the total. It must, however, in fairness to the consolidator be said that if he could show a large diversion of tonnage from highway and water lines to the railways, then much of the criticism of his activities could safely be overlooked. That he has made any considerable progress in this direction as yet, however, remains to be proved.

It is a well known fact that when business declines, it is difficult to reduce expenses in proportion. Passenger traffic has fallen off, yet the railroads have not,

as a whole, been able to withdraw service in proportion to the decline in business. Does not the same general axiom hold true with L.C.L. business? The railroads have their freight stations; their transfers; their agents at many small points; and other organizations and facilities for handling this class of business which they would still be forced to retain even if L.C.L. business should decline to a mere fraction of its present volume. Even if the consolidator did not restrict himself to a hand-picked list of remunerative traffic, the diversion of any tonnage at all which would result in a less-than-maximum use of existing facilities would tend to increase the unit cost of handling the L.C.L. business which remained to the railroad—and consequently to reduce railroad net earnings. Not only that, but as railroad L.C.L. tonnage decreases it tends to reduce the number of through package cars which the railroads themselves can run. This increases transfer handling, adds to possibilities of loss and damage and brings about lighter loading of the package cars operated.

A Question of Profits

There is another important aspect to the problem, bearing on the relation of the railroads to the public: That is the propriety of the shipping public being required to pay for its transportation a profit to an intermediary in addition to the theoretical sum necessary to enable the railroads to earn a "fair return" on their investment. In other words, if the service which consolidators offer really constitutes an economy, should not some method be worked out whereby the railroads might own these companies and add their profits to net railway operating income to be counted in toward the 5¾ per cent which the railroads are supposed to be allowed to earn?

Is there not a definite danger to the railroads, moreover, in the concentration of a large volume of L.C.L. freight into a few outside hands? This small package business is about the only business left which is not controlled by large and influential shippers who can shift their patronage over night. Forwarding companies have not shown themselves in the past altogether aloof from diverting tonnage as they saw fit. They are under no obligation to continue utilizing the same channels for shipments which such shipments followed under L.C.L. handling. What one railroad gains by such diversion, another loses. The point is, does the railroad industry as a whole gain anything by turning this business over to outsiders to route as they see fit? The domination of forwarding companies by interests affiliated with individual railroads might solve the problem, as far as these particular railroads are concerned. But would it solve the problem for the railroad industry as a whole? We do not see how it could, unless virtually every railroad should follow suit and organize or otherwise control a forwarding company of its own.

Another complexity of the situation arises from the so-called "container-mile" rate. This rate received an initial experimental application some years ago and a proposed extension of it is now under suspension by the Interstate Commerce Commission, with a tentative examiner's report opposing it now awaiting oral argument. This container-mile rate is not only lower than the L.C.L. rates, but in many cases it cuts the carload rates and thus provides an even wider range for the activity of the forwarding companies. Looking with some doubt as we do upon the wisdom of fostering any considerable growth of diversion of traffic to handling by consolidators, we are inclined to accept the examiner's disapproval of the rate as wise. Moreover, the rate certainly would involve for many railroads a decrease in net revenue—at any rate that is their opinion, and it is an opinion which is entitled to as much consideration as that of railroads which believe that the rate might aid them. It is mighty easy to reduce rates. It is much more difficult to get them up again if the reductions are later found to be unwise.

The consolidator's activities are perfectly legal. Moreover, we do not think that any law is necessary to curb them. Such a law might work a real hardship in some cases, upsetting time-honored trade practices, without conferring any particular benefit upon the railways. The problem as we see it is not so much to curtail past practices as it is to make haste slowly in bringing about an innovation which may have far-reaching consequences.

The device which has contributed largely in bringing this problem to the railroads is the merchandise container. Experience with it, extending over some years, seems to indicate that service such as the consolidator provides is necessary if this new transportation tool is to be generally used. There are many able railroad men who see in this new device an answer to the problem of highway competition. That it offers any promise along this line is reason enough alone why it should be accorded a thorough trial. The difficulty seems to be to give it this trial without at the same time running the risk of raising up obstacles as great as that which the container might overcome.

Tentative Suggestions

Tentatively, we suggest the following:

1. That the consolidators be left undisturbed as far as demands for legislative restrictions are concerned.

2. That the railroads consider the advisability of establishing or acquiring a railroad-controlled consolidating agency in which all railroads would be invited to share, assuring to each participating railroad an equitable share of tonnage on some such basis as express tonnage is apportioned.

3. That the company be at first a non-common carrier competing on an equal basis with independent forwarding agencies, with the idea that, if it were successful, it might later become a common carrier and relieve the railroads of all L.C.L. business.

4. That the Railway Express Agency, which the railroads already own, be considered as an agency for assuming this task, with whatever minor change in the Interstate Commerce Act might be necessary to make this legal if it is not already so.

There will probably be many criticisms of the above suggestions, but we believe that, on the whole, they provide for most of the advantages to be gained by utilizing the services of independent forwarding companies, while at the same time they avoid some of the more obvious disadvantages. The suggestion that the Railway Express Agency be considered as a logical organization to handle this work occurs not only because it is railway-controlled and already has worked out a plan for dealing equitably among carriers, but also because the railroads have their good money invested in this company. If container operation should ever become an outstanding and general success, the competition it would offer to the Express Agency might well be severe. The railroads might consider utilizing this organization further for any tasks for which it is suited rather than to curtail in any way its activities.

The railroads which have pioneered in this movement deserve the thanks of the railroad industry for their courage. While complete agreement as to just what the proper solution for this problem should be is not yet in sight, nevertheless the first step as always is to do something. The railroads which have taken this step would, we believe readily admit that the whole development is even yet in the experimental stage. That being the case constructive suggestions and complete discussion of the whole situation might be of assistance to them in carrying out their plans just as it should to those railroads which as yet have formulated no definite policy. The problem is too complex for any easy solution to be hastily discovered. It is too important to be ignored.

The Use and Abuse of Questionnaires

QUESTIONNAIRES have long been a popular means of obtaining records of practice and experience and the consensus of railway officers throughout the country on various subjects. They are often employed by committees of various railway associations, occasionally by the editors of this and other publications, and not infrequently by individual railway officers, with the result that they appear from time to time in the mail of nearly all railway men who occupy positions of responsibility. It is not surprising, therefore, that the replies to questionnaires sometimes leave much to be desired in the way of completeness, if not in accuracy.

For this reason, practice in the use of questionnaires has been subject to criticism on the score of both the sender and the recipient. Those who must reply to them have intimated that they constitute a lazy man's way of gathering information and that they cannot serve as an effective substitute for personal study and investigation, while those who issue questionnaires have contended that some of the replies manifest a superficial knowledge of the facts or indifference to reporting the facts accurately.

The questionnaire serves a useful purpose in developing information of a certain type and has in this way played an important part in the preparation of valuable reports, articles, etc. However, it cannot take the place of personal observation and should be used only when no other means is readily available for gathering the information required. Within the limits of its legitimate purposes, the questionnaire deserves the conscientious attention of the recipient, since the data developed is generally of as much value to him as to anyone else. Abuse of the questionnaire by either the sender or the recipient will defeat its purpose.

Handling Freight That Is Worth $68,000,000,000

PERHAPS the importance of the freight service rendered by the railways of this country has never been more forcibly illustrated than by the data given in a report recently made public by the Bureau of Statistics of the Interstate Commerce Commission, in which estimates are given of the value at destination of all commodities transported by rail in 1928. The aggregate value of the commodities carried in carload lots is placed at $60,870,000,000, and the value of those carried in less than carload quantities as $7,391,000,000, a total of about $68,300,000,000.

The extent to which the United States has become a manufacturing country is indicated by the fact that the manufactured commodities carried, exclusive of l.c.l. freight, had a value of almost $36,000,000,000, or 60 per cent of the total value of all commodities carried in carload lots. It probably will surprise most people to learn that animals and animal products, in point of value, ranked second in the five large groups of commodities shipped in carloads, with a total value amounting to almost $8,300,000,000. "Products of agriculture" came third, with a total valuation of almost $7,300,000,000. Of course, however, most animals are produced on farms. "Products of mines" furnished the railways more than one-half their total tonnage, but in point of aggregate value this group of commodities comes fourth, with a total of about $6,300,000,000. The value of "products of forests" was about $2,800,000,000.

Perhaps the most outstanding figures in the entire report are those regarding the value of the motor vehicles and their parts carried. The total estimated value of all the motor vehicles shipped, and of their tires and various parts, was $7,418,000,000. This was more than the value of "products of agriculture," "products of mines," or "products of forests." It was almost 54 per cent greater than the total earnings derived by the railways from all their freight service.

The average value per ton at destination of all the freight carried was $53.08. The average revenue received by the railways was $3.76 a ton, or 7.08 per cent of the value. The freight service rendered by the railways was equivalent to carrying almost 11 tons 336 miles for each inhabitant. What this means will perhaps be better understood if it is stated that, on the average, they carried for each inhabitant a distance of about 336

miles no less than 9,160 pounds of agricultural products, 420 pounds of animals and their products, 11,600 pounds of minerals, 1,620 pounds of lumber and other forest products, 5,200 pounds of manufactured and miscellaneous commodities, and, in addition, 620 pounds of less-than-carload freight. The value of the freight carried on the average for each inhabitant was $569, and the amount paid for its transportation was about $40, or approximately one cent for each mile that it was carried.

In no other country in the world do railways render a freight service per capita remotely approaching that rendered by our railways. It might be interesting to conjecture how much the total value of the commodities transported by rail in this country is due to the magnitude of the scale on which our railways have been developed, to the low rates charged, and to the character of the freight service rendered.

Status of Electrical Associations

THE Electrical Section of the American Railway Association, Division IV, Engineering, has been given a new status by the regulations which were recently issued, and an abstract of which will be found elsewhere in this issue.

Formerly the report of the committee on electricity of the American Railway Engineering Association was also the report of the Electrical Section of the American Railway Association and was published in the A. R. E. A. proceedings. Now the status of the Electrical Section is similar in many respects to that of the Signal Section and the annual meeting will be held in October. Committee reports will be presented to and approved by the Electrical Section and will in turn be submitted to the Engineering Division at the annual A. R. E. A. meeting in March. The A. R. E. A. committee on electricity will probably eventually act as a representative body to select for the A. R. E. A. proceedings material prepared by the Electrical Section, rather than to originate new material.

Related Association Activities

Not enough attention is being given to electrical subjects in the railroad field and the new Electrical Section should serve to stimulate activity in this direction. To avoid unnecessary duplication of effort, it is highly important that each association dealing with applications of electricity to railroad service recognize the work being done by the others. The several associations involved are the American Institute of Electrical Engineers, the American Electric Railway Association, the National Electric Light Association, Division V, Mechanical, of the American Railway Association, the Association of Railway Electrical Engineers and the new Electrical Section, Division IV, A. R. A.

Work done by the A. I. E. E. usually consists of papers presented by individual members and a general summary of progress each year. Subjects for papers can easily be chosen which will not duplicate the activity of committees in other associations. The A. E. R. A. is now working closely with the Electrical Section in one branch and this co-ordination can and will be spread to other branches. The N. E. L. A. attacks the electric traction subject as a power problem and arranges its report for the benefit of power supply companies. In this way, the work differs somewhat from that being done by any other association; the only important criticism of its activities has been that it asks the railroads for information which is essentially the same as that given to other associations, but which is requested in different form, requiring a considerable amount of extra effort. Division V, Mechanical, A. R. A., receives reports on electric rolling stock and automotive rolling stock, as well as locomotive and car lighting. These latter deal essentially with operation.

In most cases there is not much overlap of membership. When a single subject of interest to several groups is to be prepared, unnecessary duplication of effort in compiling the material could be prevented by having each interested association co-operate in the compilation and present the same data as a joint report to its own membership.

Electrical Section and A. R. E. E.

It would seem that the Electrical Section, as has been the case in the past, should concern itself with engineering rather than operation and might cover the entire field of electrical engineering for the steam railroads except for conflict with the Association of Railway Electrical Engineers. This body which has been active and growing for 20 years receives reports on reciprocal relations, power, locomotive electrical equipment, illumination, self-propelled vehicles, motor and control equipment, electric welding and heating, train lighting and application of radio to railway service. It issues its own manual of standard and recommended practices. It does not now report on any phase of heavy electric traction.

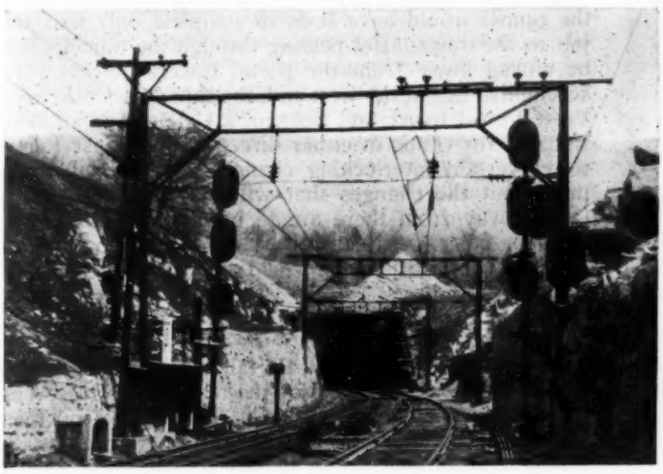
The Electrical Section receives several reports on electric traction and in this there is no conflict. On the other hand it does receive reports on yard floodlighting, lamp schedules, insulators, insulating tape, power, etc., and will undoubtedly be expected to extend its activities under its new status. If duplication is to be avoided, the two associations will either have to arrange for direct co-operation or for a division of subjects.

The A. R. E. E. has the advantage of freedom of action and has a reputation for doing things. The Electrical Section has the advantage of recognized official standing in the A. R. A. Under the new form of organization it will undoubtedly be much more active than it was under its old status. The Electrical Section represents in general the engineering activities of the railroads, while the A. R. E. E. is a horizontal division of personnel including several departments, but with mechanical department men predominating. It will be difficult to get these two groups together, but it is worth a real effort.

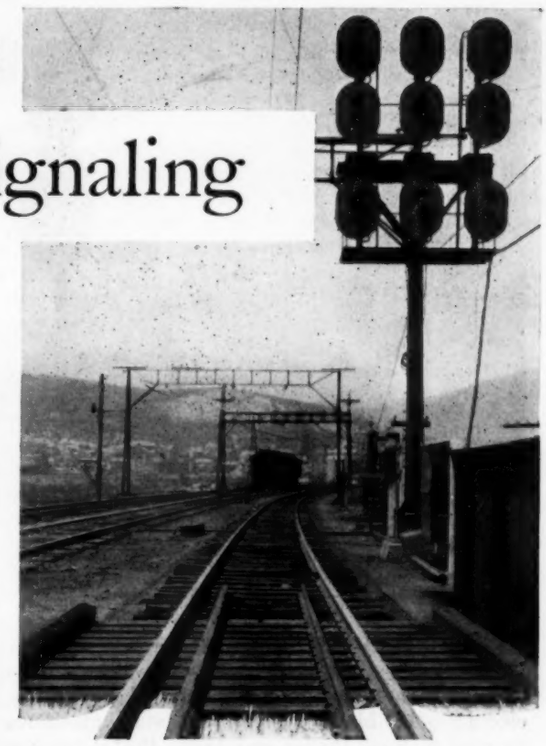
Boston & Maine Uses Reverse-Traffic Signaling in Hoosac Tunnel

By E. N. Fox

General Signal Inspector, Boston & Maine



Signaling at West Portal of Tunnel



Three-Track Signaling at Sprague's Cabin

Extensive rearrangement of signals and interlockers speeds up traffic

IN order to expedite train movements, the Boston & Maine has recently installed a new signal system on on its double track line through the Hoosac tunnel, by means of which trains are now operated through the tunnel by signal indication in either direction on each track, and also in either direction on the tracks in the electrified territory adjacent to the tunnel. The Hoosac tunnel is located 136 miles west of Boston, Mass., on the main line of the Fitchburg division, which connects Boston with the western gateways of the Boston & Maine; namely, Troy, N. Y., Mechanicville, and Rotterdam.

Line Through Tunnel Is Five Miles

The line through the tunnel, which is nearly five miles long, is level for about 1,650 ft. in the vicinity of the central shaft, with 0.5 per cent grades descending to each portal, the track at the center being 66 ft. higher than at East Portal and 56 ft. higher than at West Portal. This tunnel is exceeded in length, at present, only by the Connaught tunnel on the Canadian Pacific, the Moffat tunnel on the Denver & Salt Lake, and the Cascade tunnel on the Great Northern.

During 1910, the tunnel was electrified, together with 1.04 miles of road east of East Portal and 2.04 miles of road west of West Portal. The system used comprises an overhead trolley, carrying 11,000 volts, 25 cycle single phase. The electric locomotives haul the entire train, including the steam locomotives, the fires of which are banked before entering the tunnel.

The traffic through the tunnel consists of 12 passenger and from 25 to 37 freight trains per day, the best known passenger train being the "Minute Man," running between Boston and Chicago via the B. & M. and the N. Y. C. The normal and the maximum volume of traffic are shown in the accompanying table, the term "maximum" referring to the traffic on an unusually heavy day or hour, but not the heaviest traffic ever handled.

Previous Signaling Combined with Staff System

Along with the introduction of electric propulsion, a 60-cycle a-c. signal system was installed, color-light signals being used within the tunnel, and two-arm home and distant semaphore signals outside. Trains were operated as with any automatic block signal system, except that before a train could pass a "stop" signal within the tunnel, the engineman was obliged to telephone the train director at West Portal tower and receive permission to do so. In case of a power failure, or of necessity to operate the tunnel as a single-track

Movements Through Hoosac Tunnel

	Westbound			Eastbound		
	Per Day		Per Hour	Per Day		Per Hour
	Average	Maximum	Maximum	Average	Maximum	Maximum
No. of passenger trains.	6	6	1	6	6	1
No. of freight trains....	13	19	2	12	18	2
No. of light engines...	5	9	4	6	7	1
No. of freight cars.....	1,038	1,375	186	717	1,237	185
Total freight tonnage...	28,847	36,901	4,563	33,096	59,898	4,800

View at Soapstone Switch Looking West

line, train movements were handled by means of an electric staff block system, the staff machines being located at East Portal and West Portal towers. Possession of a staff conferred upon the engineman the absolute right over all trains, regardless of the indication of the manual-controlled tower signals at the entrance to the tunnel and the automatic block signals within the tunnel.

Increased Traffic Made Change Desirable

This method of operation proved satisfactory until the increasing volume of traffic in recent years resulted in the tunnel becoming the "bottle neck" of the division, causing numerous train delays. These delays were occasioned by the fact that the trains had to stop before entering the tunnel to attach the electric locomotive and test the air brakes, and again, upon leaving the tunnel to cut off the electric locomotives. Delays were further aggravated by the custom of running trains in "fleets." Approaching the tunnel in each direction is a third track to enable the electric "motors" to be attached and the air tested on two trains at the same time. As a result, two or three trains were frequently waiting for an opportunity to run through the tunnel on the one track while the other track was entirely clear of traffic, or vice versa. Similarly, a freight train which did not have quite enough time to get through the tunnel ahead of a passenger train moving in the same direction, would have to wait 30 min. at the portal, whereas if the other track was clear, the passenger train could run around the freight and both trains be kept moving. Clearly, the answer to this condition was to install either-direction signaling on each track.

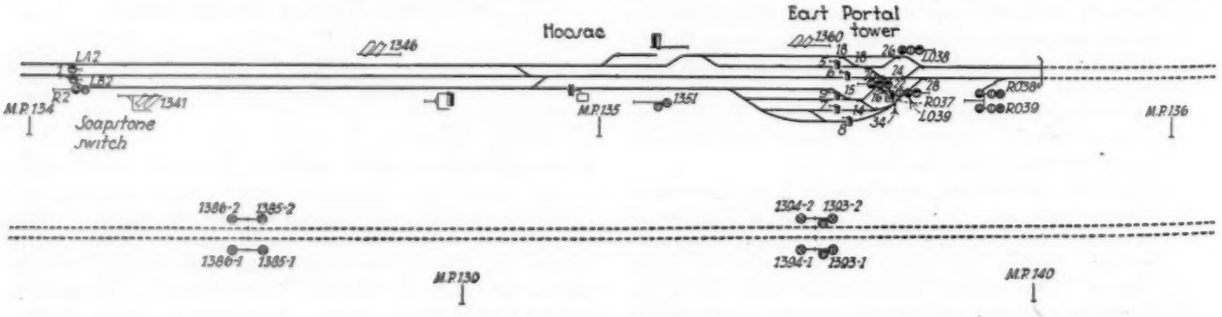
Another reason for either-direction signaling was the necessity of operating for considerable periods of time with only a single track, owing to a train breaking down on one track, or to the periodical inspections of the tunnel roof for loose stones and of the insulators supporting the 11,000-volt trolley wires. This meant, with trains running against the current of traffic and, therefore, using the staff system, that only one train could proceed between the portal towers at a time. As the running time for a freight train through the tunnel averages 18 to 24 min. this restriction imposed a considerable handicap on an operating department that was working hard to speed up traffic.

To have installed improved signaling merely through the tunnel would have been to complete only half the job, as the trains, after passing through the tunnel, must be moved away from the portal towers quickly. To accomplish this at the west end, the three tracks between West Portal tower and Sprague's Cabin have all been signaled for traffic in either direction. At East Portal tower certain interlocking changes have already been made, but the changes that will aid most in starting traffic away from there are to be made in connection with the centralized control system that is about to be installed between East Deerfield and East Portal, a distance of 34 miles.

Train Movements Directed From One Point

All traffic between East Portal tower and Sprague's Cabin is under the control of the train director at West Portal tower. The towerman at East Portal operates the switches and signals at that location, as well as the remote control switch and signals at Soapstone Switch. He also operates Signals *RO38* and *RO39,* allowing westbound trains to enter the tunnel, but he cannot clear these signals unless the traffic levers at West Portal are in proper position. Once a direction of traffic is established on either track in the tunnel, the director at West Portal cannot change his traffic levers to reverse the traffic direction until, (1) all opposing signals at East Portal tower are in the normal (stop) position, and (2) the traffic lock lever at East Portal is in its normal position and all track circuits (on the track affected) from the opposing signals at East Portal tower through the tunnel to West Portal tower are unoccupied.

The director at West Portal handles the switches and signals at that location, as well as Signals *RO3, RO4* and *RO5,* which permit eastbound movements from Sprague's Cabin, thereby giving him direct traffic control in either direction between these two locations. The switches at Sprague's Cabin are operated by a ground switchman stationed there. A table interlocking



Track and Signaling Plan of Two and Three-Track Line in the Vicinity

machine has been provided in his cabin, giving him control over Signals *L1, L2, L3, R3* and *R4*. The switches at the two interlocking towers are operated mechanically from existing interlocking machines, but all of the signals throughout this installation are new, and are Union Style-R color-light type. All home interlocking signals are of the three-unit type, that is, they have top, middle, and bottom arms. Shortly after the work of installation commenced, a new system of aspects was adopted for all color-light signaling, using three colors when desirable, red, yellow and green, for the top and middle units, instead of the former two-color (red and green) units. This system was adopted to permit the use of intermediate cautionary signals, as well as to give an approach-medium indication.

At the same time, a new standard was adopted for automatic-block color-light signals used in the approach of home interlocking signals, comprising a two-unit signal with the lower light staggered about 13 in. to the right of the upper light, thereby providing an engineman with a distinctive indication that he is approaching an interlocking plant. For a clear signal, green over green has been employed instead of the frequently used green over red. This does away with the use of red at a clear automatic block, and, as red has greater visibility than green, eliminates, in high-speed territory, the undesirable feature of the liability of the engineman seeing a red signal before he can see the green light when he is approaching a clear signal. The other aspects used are yellow over green for "approach-medium," yellow over red for "approach," and red over red for "stop-then-proceed." Light-out relays are used to prevent a less restrictive indication being given in the event of the failure of one of the two lights, although it is questionable, in view of the powerful headlights in use at present, whether such a precaution is necessary.

Hoosac Tunnel Signals

Under the old signal layout, the tunnel territory was divided into three blocks, there being only two signals actually in the tunnel for each track. These consisted of two-unit color-light signals giving the same aspects as the night aspects on the two-arm automatic-block signals. With the new signaling, the tunnel is divided into five blocks, there being four signals within the tunnel each way for each track, making a total of 16 signals. This, of course, permits closer spacing of trains through the tunnel. These signals are of a tunnel type, mounted on the side of the wall, and back to back to provide for reverse running. For trains running against the normal current of traffic, the signals are at the left side of the track, but on account of the type of cab on the electric locomotives, the visibility is practically the same. The signals are single-unit three-color type, except for the last signal each way before leaving the tunnel. These latter signals have two units similar to our standard approach signal previously described, except that, owing to clearance limitations, it was not possible to stagger the lights. They act as the approach signals for the home interlocking signals at the portal towers.

During the winter months it is much warmer within the tunnel than out of doors. Hence, on account of this and the prevailing westerly winds, it has been found necessary to put doors on the West Portal from December to March to prevent winds of hurricane force traversing the bore. The doors are kept closed all of the time, except for the passage of trains. During these months, color-light signals, located 1,000 ft. within the tunnel, are placed in service, indicating "red" if the door is closed and "green" if open.

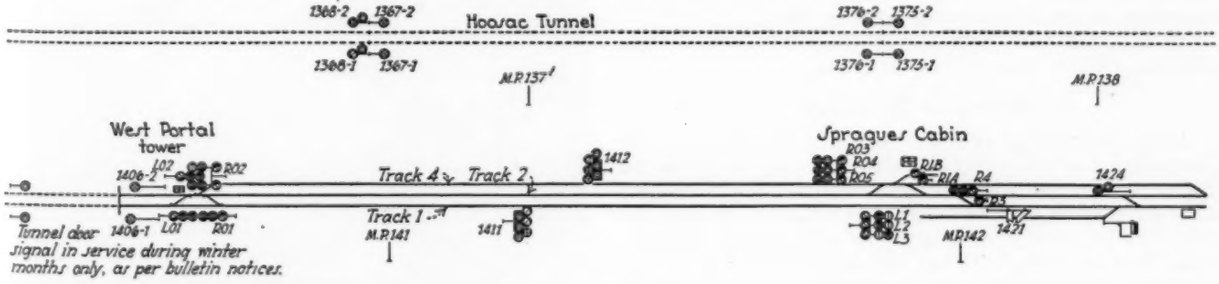
Automatic Train Stop

In connection with this project, the seven electric locomotives which handle the tunnel traffic have been equipped with automatic train stop of the General Railway Signal Company inductive intermittent type. Before adopting the intermittent type, one locomotive was equipped and careful tests were made to insure that the heavy 25-cycle return propulsion current would cause no interference with the proper operation of the train stop device. All tests of this nature were successful, no interference being noted. Further tests were then conducted to ascertain the maximum permissible air gap between the receiver and the inductor, as well as the maximum slow speed at which an engine could pass a stop inductor without receiving a restrictive indication. Tests proved that a failure to receive a restrictive indication would not be obtained until the speed was less than ¾ mile per hour.

The locomotives are all double-end control and, hence, had to be equipped with train stop apparatus for reverse running, each cab being provided with all necessary control equipment. A receiver is mounted at the forward right side of each cab, and the proper receiver is automatically cut in, depending upon the direction the locomotive is operating.

With the exception of the train stop apparatus, the materials and apparatus for the entire signal installation were furnished and installed by the Union Switch & Signal Company.

SEVEN THOUSAND CARS switched per day is the record set by the Hamm yards of the German Railways. These yards, the largest in Germany, are located at the gateway to the Rhenish-Westphalian industrial region and are fully equipped with modern switching and retarder systems, similar to many in use in this country. Switches are set in four-fifths of a second by electro-pneumatic machinery, while cars are started toward the classification tracks at an initial speed of .25 feet per second. The operations at Hamm represent about 1.7 per cent of the 190 million switchings required annually in the freight service of the German railroads. The total cost of this switching is about $153,000,000, or 15 per cent of all operating expenses.



of the Hoosac Tunnel—Reverse Traffic Signals on All Tracks

A. R. A. Electrical Section Reorganized

REGULATIONS governing the conduct of the Electrical Section, Division IV, Engineering, American Railway Association, have been issued which give it a status somewhat similar to that of the Signal Section. The more essential parts of these regulations including membership requirements are as follows:

The name of this organization is the "Electrical Section, Division IV, Engineering, American Railway Association." Its object is the advancement of knowledge pertaining to the application of electricity to railway service. The means to be used for this purpose shall be: (a) Investigation of matters pertaining to the objects of the section through standing and special committees, and the preparation of standards. (b) Meetings for the reading and discussion of reports and papers. (c) The publication of papers, reports and discussions.

Its action shall be recommendatory and not binding upon its members. Its permanent office shall be located in Chicago, Ill.

Membership

The membership of the Electrical Section shall be divided into three classes, viz: representatives, members and affiliated members.

Representative membership is limited to one representative of each member of the A. R. A. appointed by the member company and hereinafter designated as "Representative." Such representative shall be either an electrical engineer, a civil engineer or a mechanical engineer, or an official of a railway corporation, any of whom has had not less than five years' experience in the location, construction, maintenance or operation of railways and who is engaged in a responsible position in charge of work connected with the application of electricity to railway service.

Such other employees as may from time to time be presented by the railroads for reasons special to themselves, or as may be called by the electrical section for special duties may be designated as members. Persons desiring to become members are required to make application and secure the endorsement of the representative of the railway by which they are employed.

Persons desiring to become affiliated members must make written application and secure the endorsement of three representatives or members. Affiliated members may be appointed and removed by the committee of direction. The dues for affiliated members will be $3.00 per year.

Representatives shall have all the rights and privileges pertaining to the Electrical Section. Members shall have all the rights and privileges pertaining to the Electrical Section, except those reserved to representatives. Affiliated members shall have all the rights and privileges of representatives or members except those of voting at meetings of the section and holding office.

An applicant to be eligible for membership in any class shall be not less than 25 years of age.

Voting at Meetings

A vote in meetings of the Section may be taken (except for election of the officers) viva voce, by rising or by ballot, in any of which Representatives and Members may participate. If any Representative so desires, he may call for a roll call vote. The roll call vote shall be taken in accordance with the following conditions:

Each representative and member may cast a personal vote in addition to which each railroad represented in the section shall be allowed one vote for each 1,000 miles of road or fraction thereof, including trackage rights operated by it. Where electric traction matters are concerned each railroad represented in the section will in addition be allowed one vote for each 100,000 electric locomotive miles or major fraction thereof, made by its motive equipment during the preceding year; one vote for each 700,000 multiple unit car miles or major fraction thereof made by its motive equipment during the preceding year; and one vote for each 1,000 route miles of electrified track or fraction thereof, operated during the preceding year. The votes allocated to each railroad shall be cast en bloc by its representative.

The annual report of the Section shall be presented to the Engineering Division at its annual convention in March.

Committee reports shall be issued in pamphlet form and a copy furnished to each member of the Section not less than 30 days prior to the annual meeting of the section. The proceedings shall contain the reports of standing and special committees, the verbal and written discussions thereon, and the action taken by the section on the recommendations submitted.

The manual of the Electrical Section shall contain the specifications, plans, designs, definitions and principles of practice relating to the application of electricity to railway service, endorsed at the annual meetings and approved by majority vote of the accredited representatives by letter-ballot.

The annual meeting of the section shall be held in October at a place designated by the Committee of Direction.

The personnel of the Committee of Direction is as follows: S. Withington, (chairman), electrical engineer, New York, New Haven & Hartford, New Haven, Conn.; J. V. B. Duer, (vice chairman), electrical engineer, Pennsylvania Railroad, Philadelphia, Pa.; H. M. Bassett, general office engineer, New York Central, New York City; D. J. Brumley, chief engineer, Terminal Improvements, Illinois Central, Chicago, Ill.; J. H. Davis, chief engineer, electric traction, Baltimore & Ohio, Baltimore, Md.; W. M. Vandersluis, electrical engineer, Illinois Central, Chicago, Ill.; H. M. Warren, electrical engineer, Delaware, Lackawanna & Western, Scranton, Pa.; L. S. Wells, electrical superintendent, Long Island, New York City; G. I. Wright, engineer, electric traction, Reading Company, Philadelphia, Pa.

THE EXECUTIVE COMMITTEE of the Mississippi Valley Association has approved a program for making a 9-ft. channel in all of the important tributaries of the Mississippi river and will submit the proposal to the convention of the association to be held at St. Louis, Mo., on November 11 and 12.

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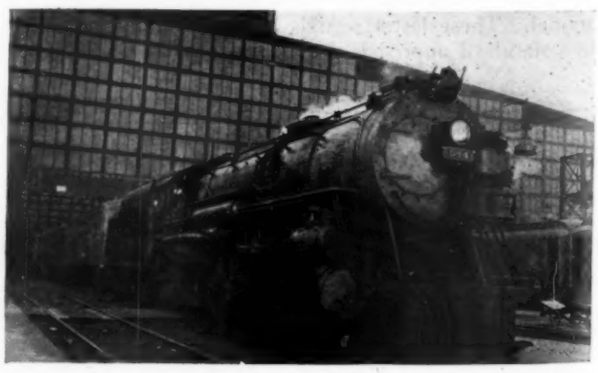


The B. & A.'s "Wolverine" at South Station, Boston, Mass.

A Group of the Delegates at the A. A. P. T. O. Convention

Passenger Officers Meet in Winnipeg

Varying results reported from experiments to increase traffic—Reports on air and motor transport

A CERTAIN undertone of optimism about the passenger traffic situation characterized the seventy-third annual convention of the American Association of Passenger Traffic Officers, which was held at the Fort Garry Hotel, Winnipeg, Man., on September 16-17. To be sure, problems—perplexing ones—were presented in abundance. At the same time, not a few railroads were able to report the definite correction of some particularly trying conditions, and discussion was frank and outspoken regarding some phases of the passenger traffic situation which have been particularly troublesome. Quite general enthusiasm regarding their experience was expressed by several representatives of railroads which operate motor coach lines. Not only do these motor coach subsidiaries appear in most cases to be saving vast sums for the railroads by permitting the removal of unprofitable trains, but the subsidiaries themselves appear in several instances to be approaching the time when they will be able to show quite satisfactory returns on the investment in them.

At the opening session, following the invocation, addresses were delivered by the Mayor of Winnipeg, the Lieutenant Governor of the Province of Manitoba, and by the Attorney General of the Province. The Lieutenant Governor spoke briefly about the Hudson Bay Railway, which is nearing completion, and predicted that in the early future Fort Churchill, the tide-water terminal of this line, would become an important seaport. Attention was drawn to the facilities for commercial and industrial development, as well as attractions for tourists, in Northern Manitoba. Following the opening ceremonies, the time-honored custom of presenting an elaborate gavel to the retiring president of the association was observed. Since the president, J. D. Rahner, general passenger agent of the Florida East Coast, is resident in South-Eastern territory, the gavel was constructed of woods—18 in all—from that section and the West Indies.

By unanimous vote the constitution and by-laws of the association were then suspended, to advance and expedite the election of W. C. Hope, retired passenger traffic manager of the Central of New Jersey and secretary of the association, to honorary membership and also to re-elect him, in advance of routine procedure, to the secretaryship for another year. This action brought prolonged applause from those in attendance.

President Rahner then addressed the convention. Later the reports of the committees on motor coach transportation and air transportation were presented by the chairmen, respectively, H. F. Fritch, passenger traffic manager of the Boston & Maine, and C. H. Mathews, Jr., general traffic manager—passenger, of the Pennsylvania. Abstracts of the address and the two reports follow:

Can Passenger Business Be Made to Yield a Profit?

By J. D. Rahner
General Passenger Agent, Florida East Coast

Passenger traffic as a business has fallen upon lean years. In far too many cases the transportation of passengers, instead of being a source of profit, has become a positive financial burden to the railway machine. As passenger traffic officers, what can we do toward a readjustment by which the business of our department may be again operated on a profitable basis? What is our duty in the premises?

Waiting for Something to Turn Up

Radical changes have taken place within the past decade. Some of these have developed so gradually that I doubt if we fully realize their significance. The fact that we have not yet even considered any definite program of adjustment seems to indicate our partial failure to recognize the permanence of these changes. Have we not been waiting, perhaps vainly, in the hope, like Micawber, that something might turn up that would solve our difficulties?

Expressing the conditions in general terms, our situation has shifted from one of passive accommodation, a service offered to the public on a "take it or leave it" basis, to that of being under the pressing necessity of not only aggressively selling our product in a competitive field, but also proving that the business of transporting passengers by the railways is economically justifiable.

At the beginning of railway development the problems in-

volved were largely of a mechanical nature, the creation of a transportation system that would adequately meet the demands of the public. The change brings us to the human side of the equation, the adjustment of the service of this railway machine, which mechanical genius has created, together with its selling and merchandising methods, to the diminished public demand which competition has brought about.

People have not stopped traveling. They are merely traveling in different ways. We should like to feel that the motor vehicle will eventually become a contributing agency, that these two quite different forms of service may become perfectly co-ordinated rather than remain competitive. In the case of commercial motor coach lines, this co-ordination of service would seem to be within the bounds of probability, but by no stretch of the imagination can it be assumed that this will be the case in connection with the privately owned motor car. There is no uncertainty as to the positive and active competition of the private automobile, nor is there a great deal of doubt that this form of competition will continue to increase as highways are improved and the vehicle is brought more and more within the ownership range of the masses.

The views of the Interstate Commerce Commission quoted by Mr. Allen at our last meeting throw some light upon the subject. Let me quote them again. "It is not a question whether any particular transportation agency shall prevail or be given the advantage. Ruthless, inexorable, economic laws will ultimately determine that, no matter what attempts may be made to impede or interfere with natural progress. The readjustment or readaptation of transportation facilities should be made with the least economic waste."

Where Merits Are Equal, the Advertised Method Gets the Business

What are these ruthless, inexorable economic laws upon which the future of railway transportation depends? Simply interpreted, the economic law which controls the market for transportation as well as the market for any other product or service is public demand or preference. If the public uses one form of transportation in lieu of another because of price, convenience, or for other reasons, we have an economic law at work which will prove both ruthless and inexorable. If the two forms of transportation were equal in price, convenience, speed and possibly other qualities which influence public choice, then advertising and aggressive salesmanship on the part of one agency might be the means of securing the advantage; but if the two forms of transportation are quite widely separated in their appeal, the public preference will decisively determine the victor.

When we were without competitive forms of transportation from which to choose, the public accepted the quality and the quantity provided by the railways. With the advent of competition has arisen the necessity of scientifically studying this vital factor of public taste in order that we may gage the quality and quantity of railway service that can be sold to the public under present conditions by more aggressive methods.

Successful business depends in large measure upon foresight, the anticipation of what the public want and will buy before the actual demand arises. To avoid economic waste it is of equal importance to anticipate what the public do not want and will not buy.

A Research Organization Needed

The first real problem before us, and one that must be conclusively answered before any progress toward readjustment can be expected, is not *how* may we increase passenger traffic volume, but *is it possible* to increase the volume of passenger traffic. Have we not been putting the cart before the horse in hoping that in some way we might regain our former prestige without carefully analyzing that change in public preference which is at the root of our difficulties? Our losses are due to the inroads made by other modes of conveyance. Therefore any increase in volume, aside from that slight normal increase which might be reasonably expected as the result of business expansion and increase in population, implies the winning back of travel from the highways.

Various methods have been tried to stem this tide of shrinking revenues, improvements in equipment, spotted reductions in fares, frills of service, faster schedules, organized tours, optional routes, etc. We have tried about everything that human ingenuity could think of and our financial means would permit to induce the public to desert their private automobiles and bus lines for railway travel, *but have we conclusively tabulated and read the significance of the results obtained by these experiments?* One of the first steps toward readjustment should be the establishment of a bureau to carefully analyze these experiments, interpret the results and therefrom decide what, if anything, can be done in the way of increasing railway travel volume in competition with motor vehicles. From such a study would also be apparent the exact niche which railway travel occupies in the present, and in the future, field of passenger transportation.

The situation seems to resolve itself into two major problems:

1. To determine accurately the quality and quantity of railway transportation that the public can be sold under present and future competitive conditions.

2. The adjustment of production to this anticipated quality and quantity of the public demand so that the resulting operation may be profitable.

Why Perpetuate Over-production?

Because of our hesitation in accepting the new conditions, our adjustment from a non-competitive to a competitive period has been slow and inefficient, resulting in over-production. At least a part of our present financial trouble may be attributed to the fact that we are producing a great deal more transportation than we are selling. If a manufacturer were to scrap 90 per cent of his product and then expect the public to pay for this economic waste in the other ten per cent which he was successfully marketing, his business difficulties would be apparent. Are we not in about this class? If we were to figure the potential revenue that might be derived from all our service, assuming that every train were filled for its entire run, and then were to compare this total with the actual revenue which we are receiving, the result would be somewhat startling.

Allied with this problem of closer adjustment of the production of railway transportation to the present quality and quantity demands of the public is the subject of further economies in operation. Railway business is peculiar in that its profitable operation depends upon both mass production and mass selling. While other industries may employ mass production they may sell under far less restricted conditions and in smaller units. Railways, however, must maintain a continuity of production and sales in trainload units, with the result, that due to the inroads of competition, this trainload unit of selling in the less densely populated sections has become too large and unwieldly for the demand. Therefore, the expedient of the smaller unit of the motor car and co-ordinated motor coach service would seem to be logical.

It is also apparent that if the passenger traffic business is to be made generally profitable, other economies of operation must ultimately be developed. One of the most important of these is the reduction in operating expense through the control of extravagant and wasteful competition within the industry. Although the competition of one railway line with another has in the past been looked upon as a healthy economic condition and has proven a valuable incentive in improving standards of service, yet beyond a certain point this competition leads to expensive practices and becomes financially burdensome. We need some established method of co-operative arbitration whereby traffic demands between commercial centers and through important territories may be jointly, rather than competitively, considered. By mutual agreement competitive carriers could then provide the service which the volume of traffic seemed to warrant, curtailing unnecessary and unsold service without relinquishing their distinction as competitors, thereby effecting decided economies in operation. Co-operative advertising and selling by mutually interested lines is another economy which merits serious consideration and might be increasingly applied.

Great Co-operation Among Railroads

The railway industry too, should develop a greater co-operative consciousness in dealing with these major problems. We complain loudly of taxes, subsidized competition, governmental regulation, decreasing revenues and fading dividends, but, like the weather, no one does anything about it. As an industry we invite criticism in that we have not thus far formulated or adopted any definite program of readjustment.

Report on Motor Transport

The experience of railroads with motor coaches covers a period of hardly five years. In that time, however, some phases of the operation of motor coaches by railroads have been developed to such an extent that their place in co-ordinated transportation has been pretty well established. Other phases of highway operation have more recently come into the picture and we right now see adjustments taking place between long distance motor coach lines and between these lines and the railroads. At present some 70 roads are operating over 2000 motor coaches.

It is difficult to describe with brevity, the status of independent motor coach operation at the time when the railroads first became seriously interested in the matter for the reason that

conditions varied so greatly throughout the country. State regulation which was in some instances first set up to meet the jitney problem, was being adjusted to fit the motor coach and there was then as now, no interstate regulation. The lack of authority of state commissions over interstate operations had just been determined by the Supreme Court. As a result of these conditions, intrastate lines were being brought within the scope of regulation and interstate lines were springing up and operating without regulation.

About 1924 some of the railroads began to realize that they should be very much interested in the motor coach as a common carrier, that it might be useful to them, and that where there was an economic demand for such service, they would have to furnish it or allow others to do so.

Value of Feeders Should Not Be Overlooked

The inroads of the private automobile had been particularly serious on the light lines of short haul travel, where service was at best infrequent, and the private automobile without a fixed schedule had fundamental advantages. The motor coach afforded a means of providing the service at less expense than by rail and in some instances the lower costs justified more frequent service, making the highway service a better competitor against the private automobile. This was the first sort of service in which the motor coach was used by the railroad. Equipment was developed which would not only handle passengers but also mail, papers, baggage and express. It has now been recognized by many railroads as a useful and economic field for the motor coach and they are making substantial operating savings by this means. At the same time communities continue to enjoy organized transportation where in some cases it would be prohibitive if the more expensive rail service were the only method available. Many such substitute services are not self-supporting because there is not sufficient business available to support even the motor coach services but frequently there is a feeder value which the railroad desires to protect and some feeling of obligation to continue to serve, especially where freight traffic-producing industries are involved. An important task of the railroad motor coach operator is the developing of types of equipment and methods of operation to fit economically the requirements of this sort of service.

Closely allied to this substitute service is the feeder into new territory. In the older parts of our country this is not as important as in the newer sections, because in the former rail lines have been to some extent overbuilt and it is now more a matter of substitution rather than new feeders. In the newer parts of the country, there is, however, the opportunity to bring off-line points closer to the railroad without the expense incident to the providing and operating a rail line. The motor coach also affords a means, in some instances, of improving the feeder service where highways happen to be more direct or better located with respect to settlements than the railroad. A feeder service may or may not be self-supporting but in determining its value, it cannot be considered alone but in connection with the effect it has upon main line revenue.

Main Line Local Service

A third form of auxiliary service is that of providing for local service or intermediate pick up and delivery between the important stops made by express trains. The speeding up of trains has become increasingly important. The more effectively to compete with the private automobile for the longer distance traffic and to attain faster schedules, it has been necessary to discontinue local stops. The motor coach is likely to be the most economical means of caring for these points, feeding their traffic to and from the express train stops. This use, however, has often been found to be rather unsatisfactory to the passengers and quite unprofitably financially. All too often it is found that the local traffic to and from the smaller points has already practically disappeared and that whatever feeder service is necessary to the express stops is being taken care of by private automobiles. Theoretically this should be a worth while form of operation but experience with it has not been encouraging. It has been found generally to be more satisfactory to care for the local business entirely by motor coach and have the rail service care for the express travel rather than to attempt to have one feed to the other.

From the railroad's point of view, the most serious form of motor coach operation is that which parallels the main lines of the railroad service between important centers where a considerable volume of traffic is involved. Many such are interstate in character where no regulatory commission has jurisdiction. Some few are intrastate where the states have no regulatory body set up over motor coach operations and there are others which have been passed on and certified by state commissions. Generally speaking, the interstate operations present the most serious problem of competition with the railroad because the competition between coach lines often results in a rate of fare lower and a frequency of service greater than a single operator would establish. This motor coach service is slower than the rail service and the rate lower, in some cases very much lower.

J. D. Rahner

H. H. Melanson

Charles H. Mathews, Jr.

W. C. Hope

Railroads have a wide variety of views as to how best to meet this problem and it would be impossible today to get anything like a unanimous opinion. Various efforts have been made by different roads to meet the situation. Rail service has been speeded up, rail equipment has been improved, rail schedules have been readjusted and amplified, and rail rates have been cut. All of these have been supplemented with publicity. In other cases, or sometimes simultaneously, the railroad has gone into the motor coach business itself where competitors are operating, are likely to operate or where there is a public demand for such service.

It is not expected that any of these activities will force motor coaches out of the field where they are economically justified. The allotment of traffic between the motor coach and rail will be determined on economic grounds and will not be permanently influenced by unsound practices. Important in the economic factors which will affect the ultimate distribution of patronage are cost, time consumed, convenience, comfort and safety. No one alone is controlling and different groups of the public are interested in the various factors to different degrees.

Railroads Should Take Steps to Hold Traffic Which They Can Handle Economically

It is highly desirable in this period when the division of traffic between the railroads and the highways is being worked out, that railroad officers realize what is taking place and that they try reasonable experiments with the object of retaining as rail traffic just as large a part of the total available business as

is possible. If the aggressiveness of the new industry is met with only passive resistance on the part of the older, the division of business on what may appear to be the economic grounds is likely to be wrong and to the disadvantage of the railroad because the true economic possibilities of rail service have not been demonstrated and sold to the public.

To Develop "Rail Consciousness" in Motor Age

It is impossible as yet to draw any very definite conclusions from the various experiments with service and rates which have been attempted by the railroad to meet motor coach competition. In fact, it is dangerous to say, because a certain procedure was successful or unsuccessful in one case, that the same result would follow if applied under different circumstances, but it can be safely said that such activities have at least to some extent stimulated rail travel and have created in the public mind the feeling that the railroads are after passenger business and are willing to change their methods, if necessary, to get it. Some reductions in rate seem to have produced very substantial increases in volume of traffic. We hear much of the desirability of the public becoming "air-minded". We should see to it that the rising generation brought up in an automobile becomes "rail conscious".

The Most Successful Railway Motor Coach Lines Compete With Their Own Trains

Railroads which are operating motor coach lines in competition with their rail lines have found that such operations are of assistance in keeping competition on a sounder basis than would otherwise be the case, or, if such is not the present result, expect it will eventually so work out when interstate lines are put under regulation. Such activities have been the most generally successful experiments undertaken.

Many such operations are carried on on a highly profitable basis, even in the face of competition and the traffic attracted to the motor coaches between some of the larger cities is truly astonishing.

The recent consolidation of long distance motor coach lines, makes it very certain that long distance motor coach journeys will be made more convenient than in the past and where two or three hundred miles has been about the limit of competitive operations, this will be expended to the breadth of the continent.

Motor coach "all expense" tours have grown to be a very considerable business. Experiments have demonstrated that a railroad can operate such tours to advantage over the highway, co-ordinating them to some extent with their rail service. Railroads with widespread selling organizations are particularly well situated to operate such tours. The chartered or special party motor coach gives the railroad a means of getting business where regular train service is not convenient and the size of the party will not warrant special train service.

The satisfactory operation of long distance highway lines, "all expense" tours and special party trips frequently means through equipment moving beyond the territory of the originating railroad. Through long experience, satisfactory methods have been worked out for the handling of interline rail movements and we feel that experience again will help us to work out the interline highway problem where conditions are somewhat different than in rail operation.

Your committee feels that in order to assure the proper economic proportion of the passenger business to the railroads, we as passenger traffic officers, should see to it that all the economic possibilities of the railroad are tried out and that we should seriously consider the advisability of serving by motor coach that part of the traffic in our territory which can best be so served.

Report on Air Transport

The year 1926 witnessed startling developments in the aeronautical program in the United States; flying became a recognized public service. American aviation, including not only flying itself but also the manufacture of equipment and the development of airports and airways, began to assume the proportions of a major industry. The air transportation lines extended their service in every direction and the total mileage flown was twice that of the preceding year, while three times the quantity of mail and more than four times the number of passengers were carried than in the year 1927.

During the year 1928 there were 4500 airplanes in commercial use throughout the United States and not only was the airplane being put to more varied uses than ever before but a greater number were actually in service. While the European air lines carried more passengers than the American operators, nevertheless aerial passenger traffic was growing at such a rapid pace that it promised to exceed that of the heavy subsidized air lines of Europe in the not distant future.

This expansion took other forms such as the number of cities providing airports which increased from 100 to approximately 1,000. Flying clubs were quite extensively organized as well as aeronautical shows and exhibitions and aviation was adopted as a course included in the curriculum of a number of colleges and universities.

Railroads Co-operating

The way was being paved for the development of this new form of transportation of which speed is one of the principal factors and aeronautics in the United States was being built on a firm foundation not by direct subsidies from the government, but by a more constructive form of support, namely by co-operation, which strengthened and seasoned the industry by challenging its pluck and energy and arousing its ingenuity.

Railroads participating include the following:

Atchison, Topeka & Santa Fe
Atlantic Coast Line
Baltimore & Ohio
Chicago & Eastern Illinois
Chicago Great Western
Chicago, Milwaukee, St. Paul & Pacific
Florida East Coast
Great Northern
Illinois Central
Kansas City Southern
Louisville & Nashville
Missouri-Kansas-Texas
Missouri Pacific
Mobile & Ohio
Nashville, Chattanooga & St. Louis
New York Central
New York, New Haven & Hartford
Norfolk & Western
Northern Pacific
Pennsylvania
Southern Pacific
Texas & Pacific
Wabash

While the Pennsylvania is the only one of these rail carriers announced to have become financially interested in an aviation company participating in co-ordinated rail-air service, nevertheless all of the lines indicated above have become associated with this new mode of transportation either in the sale of air tickets, co-operative publicity, or instructions to their representatives as to the service provided by certain air lines.

The principal aviation companies associated with railroads are:

Boeing Airplane & Transport Corporation
Mid-Continental Air Express
Maddux Air Lines
Northwestern Airways, Inc.
Pan-American Airways
Standard Airways
Transcontinental Air Transport, Inc.
Universal Airline System
Western Air Express

The outstanding co-ordinated rail-air services are:

1. The service placed in effect June 14, 1929, by the New York Central in connection with the Universal Airways and Western Air Express; also the Atchison, Topeka & Santa Fe providing forty-six hour service between New York and the Pacific Coast—two nights and one day by train and one day by airplane.
2. The coast to coast service in forty-eight hours established July 8 by the Pennsylvania and the Atchison, Topeka & Santa Fe in connection with Transcontinental Air Transport, Inc.—two nights by train and two days by plane.

These two services are mentioned as outstanding because of the elaborate preparations made in placing the service in effect, the unusual distances covered and the volume of traffic which has been developed.

Rate of Fare

While it is difficult to secure any definite information as to the fares charged by commercial aviation companies, nevertheless it is generally understood that these passenger fares vary from nine cents to fifteen cents per mile for the longer distances—in certain instances for the shorter distances higher charges are exacted.

The Department of Commerce bulletins indicate that the average passenger charges for the past several years have been as follows:

Year	Rate per Mile
1926	12 cents
1927	10 cents
1928	11 cents

It is apparent that until such time as commercial planes accommodating a greater number of passengers and operated on a more economical basis are constructed that there will not be an opportunity to place in effect lower charges which will, of course, tend to popularize air transportation more generally insofar as the traveling public is concerned. There is no question that within the no distant future the airplane manufac-

turers will be in a position to meet this situation—in fact developments in airplane construction with the past several months would indicate that great progress is being made in that regard.

Under the present arrangements the commercial air companies transport without charge 25 or 30 pounds of baggage free and approximately 25 additional pounds per passenger when the plane load will permit, for which varying charges are made.

Certain of the interested rail lines have placed in effect an arrangement whereby heavier-than-airplane baggage may be checked by passengers using air service for a charge equivalent to double the excess baggage charge over that portion of the journey where air service is used. While to date this arrangement seems to have been satisfactory and necessarily must be continued until such time as the aviation companies become common carriers and can participate in baggage tariffs filed with the Interstate Commerce Commission, nevertheless in the future it may be necessary to consider interchange baggage arrangements with the air lines.

It has been exceedingly difficult to obtain any specific data showing the volume of traffic handled by air transport lines. While there is available certain information of this character insofar as specific rail-air services are concerned, nevertheless for the general results we are dependent upon the statistics compiled by the Department of Commerce which show:

Passengers carried for hire by air

Year	Passengers
1926	5,700
1927	8,700
1928	33,000

It has been equally difficult to obtain any definite information regarding operating costs and resulting net revenues from commercial aviation passenger operations during the past year. We assume we are safe in stating, however, that insofar as the revenues obtained directly from passenger travel are concerned they are not generally sufficient to meet the expenditures and any net revenue which may be secured by the air companies are dependent upon mail and package express carried by their lines.

While air companies are operating as private carriers and will undoubtedly endeavor to retain that classification as long as they are able to do so, the rapid growth of commercial aviation has prompted some states to become actively interested in the general supervision of this new form of transportation through their public Utilities Commissions and it is possible that eventually the Interstate Commerce Commission will assume jurisdiction over them.

Railroads now participating with the various air lines in the new combined rail-air service have thus far not developed any appreciable revenue, but through valuable publicity given the new service in the daily newspapers throughout the country have derived incalculable profit therefrom and have demonstrated in the development of this form of transportation a progressive policy which has been keenly appreciated by the traveling public.

The travel thus far developed and the reliable performance accomplished by the air transportation routes in this country insures a bright future for the industry and the keen interest which has been displayed throughout the country on the part of the traveling public in travel by air is an almost infallible indication of the substantial patronage which will eventually be enjoyed by the larger air transport companies that are so rapidly developing comfort for their passengers and safety in operation.

There is no doubt, however, that the rail carriers of the country will continue to be the backbone of passenger transportation for an indefinite time in the future.

Other Business

The improved facilities which some railroads are providing for coach passengers were discussed at length. Representatives of lines operating de luxe all-coach trains reported that they were attracting traffic without drawing unduly from other trains—in other words they had apparently brought some traffic which formerly did not move by rail. The design of seats was considered quite important and recent models of the bucket type were said to be a great improvement over those first used. Some question was raised as to the practicability of the use of seats of this type in night trains. It was thought that the inability to turn the seats over to face each other was a hardship on passengers making an all night trip. Opinion differed on this subject. One road which placed cars with bucket type seats on an all-night run had many complaints. Others found that their passengers were well satisfied with this type of seat for night travel.

One member stated that one of the early objections to the seat had been overcome by making the arm between the seats collapsible. Individual ventilators to be operated by passengers were reported to be satisfactory. Another improvement which was said to be greatly appreciated by coach passengers was cleaner and more comfortable lavatory facilities, where both hot and cold water were provided. Painting trains a distinctive color was also reported to have attracted much favorable attention.

The question was raised as to whether, when free observation and club car facilities were provided for club passengers, all passengers did not try to obtain these seats. Roads operating such cars, however, had not, it was said, experienced any such trouble.

One member reported that a great increase in dining car patronage had been secured by passing out circulars among coach passengers, showing sample menus and the reasonable prices charged. It was found that many coach passengers had been staying out of the dining cars because of a fear that they would be overcharged and that this fear had been eliminated and business increased.

The question of the use of the enclosed solarium instead of the open observation platform was discussed, disclosing some difference of opinion. Some members believed the solarium to be in greater year-round use, while others stated that in very hot weather the open platform was preferred.

The provision of coach service on limited trains heretofore operated with Pullman equipment exclusively was commented upon, with the road providing this service stating that the service was well patronized—perhaps not for the entire run of the train but to or between important intermediate points.

Experience with reduced-rate single and round-trip tickets good only in coaches was thoroughly discussed. Several instances were cited where this service was offered and, while attracting an increase in passengers, it had not increased gross revenues. The question was raised, however, whether the decrease in gross revenues might not have been greater had not some such concession been offered. Several such experiments are now in course of trial and could not be reported upon conclusively. Some fear was expressed that such rates made in particular cases to meet special competitive conditions might complicate the through-rate structure, although tickets sold at these special rates are generally restricted considerably when compared with ordinary first class tickets.

Several delegates reported great success with low rate round trip week-end excursions over long distances. One large railroad had a gross revenue of $4,000,000 from this source last year, an increase of 25 per cent over the preceding year. Another road reported success with a rather novel type of excursion—a Sunday excursion from a large city to suburban points. The purpose was not only to increase revenue, but also to aid homeseekers in finding residences in the road's territory.

The tariff for the transportation of passengers' automobiles in effect in Southeastern territory was described. Used cars only are handled on this tariff and the rate is five full fares for the transportation of two persons and one automobile, valuation being at the insured value of the automobile. The automobiles are handled in fast freight service. It was suggested that, for the experiment to have a thorough trial, it should be extended to connections beyond the Southeast. One member thought that some arrangement might be worked out with the Railway Express Agency for handling these automobiles.

The use of the open ticket counter in stations, as

opposed to the enclosed cage, was discussed, the accepted opinion appearing to be that the counter was to be preferred in the larger stations having long hours of service, but the cage should continue in less important stations.

There was a discussion on joint advertising and publicity. It was pointed out that such advertising might be divided into two categories—that of a specific service, such as excursions operated by competing carriers between the same points; and second, that of a general campaign to promote railway travel in general, as opposed to other forms of transportation. It was moved and carried that a committee be appointed to study and report on this subject.

Election of Officers

Officers for the ensuing year were elected as follows: President, H. H. Melanson, general passenger traffic manager, Canadian National; vice-president, C. H. Mathews, Jr., general traffic manager—passenger, Pennsylvania; and secretary, as already noted, W. C. Hope. Following the convention the members and guests were taken on a tour of Western Canada by the Canadian National and Canadian Pacific, stops being made at Saskatoon, Sask., Edmonton, Alta., Jasper Park, Banff, Lake Louise and Calgary, Alta., and Regina, Sask. The special train was operated from Chicago via the Chicago & North Western and the Duluth, Winnipeg & Pacific and returned via the Minneapolis, St. Paul & Sault Ste. Marie and the Chicago, Milwaukee, St. Paul & Pacific.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading for the week ended September 14 amounted to 1,153,062 cars, an increase of 15,002 cars as compared with the corresponding week of last year and an increase of 25,419 cars as compared with 1927. It also represented a considerable increase as compared with the week before. All districts except the Southern and Central Western showed increases as compared with the corresponding weeks of both previous years and only the Central Western showed a decrease as compared with last year. Loading of coal, coke, ore, merchandise and miscellaneous freight was larger than in the previous two years while grain and products, livestock and forest products showed decreases as compared with both years. The Summary, as compiled by the Car Service Division of the American Railway Association, follows:

Revenue Freight Car Loading

Week Ended Saturday, September 14, 1929

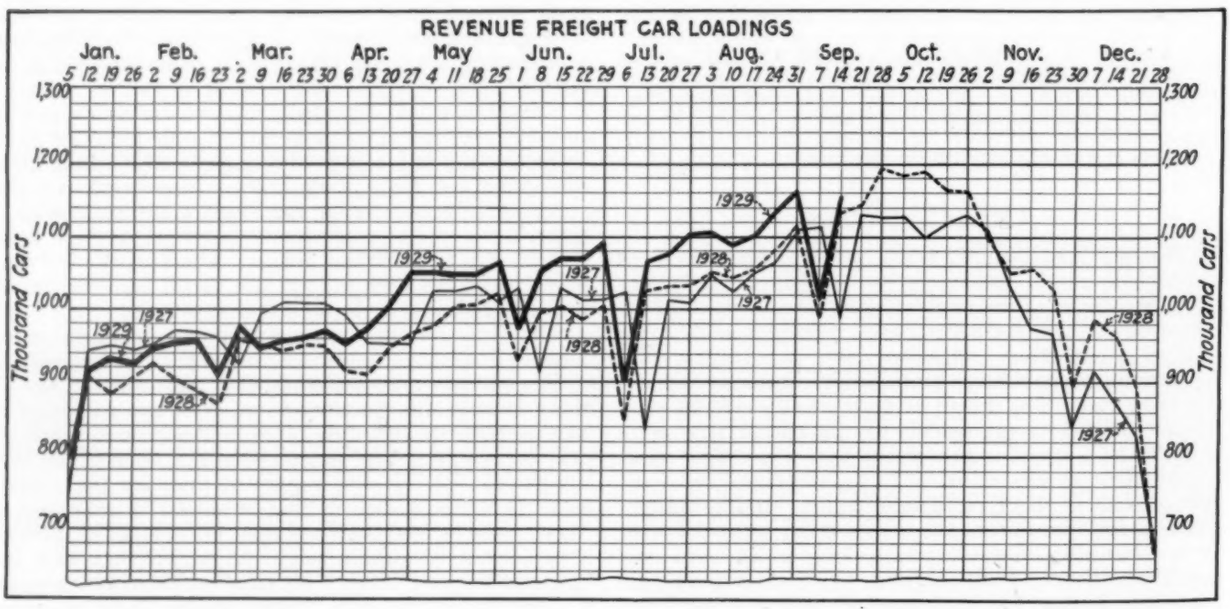
Districts	1929	1928	1927
Eastern	259,931	254,739	247,191
Allegheny	234,703	231,226	224,912
Pocahontas	65,965	61,710	64,663
Southern	154,258	151,140	165,909
Northwestern	178,606	176,947	175,733
Central Western	167,985	170,871	161,926
Southwestern	91,614	91,427	87,309
Total Western Districts	438,205	439,245	424,968
Total All Roads	1,153,062	1,138,060	1,127,643
Commodities			
Grain and Grain Products	52,867	57,009	60,655
Live Stock	29,263	34,362	31,765
Coal	191,753	180,672	182,811
Coke	11,241	9,732	9,742
Forest Products	64,798	65,192	69,278
Ore	69,600	63,932	56,511
Merchandise L. C. L.	269,242	266,821	268,550
Miscellaneous	464,298	460,340	448,331
September 14	1,153,062	1,138,060	1,127,643
September 7	1,017,072	991,385	989,799
August 31	1,160,210	1,116,711	1,117,360
August 24	1,135,567	1,080,698	1,109,341
August 17	1,100,267	1,057,909	1,066,828
Cumulative totals, 37 weeks	37,511,145	35,883,666	36,919,749

The freight car surplus for the first week in September averaged 157,606 cars, including 86,890 box cars, 32,779 coal cars, 20,914 stock cars and 11,778 refrigerator cars.

Car Loading in Canada

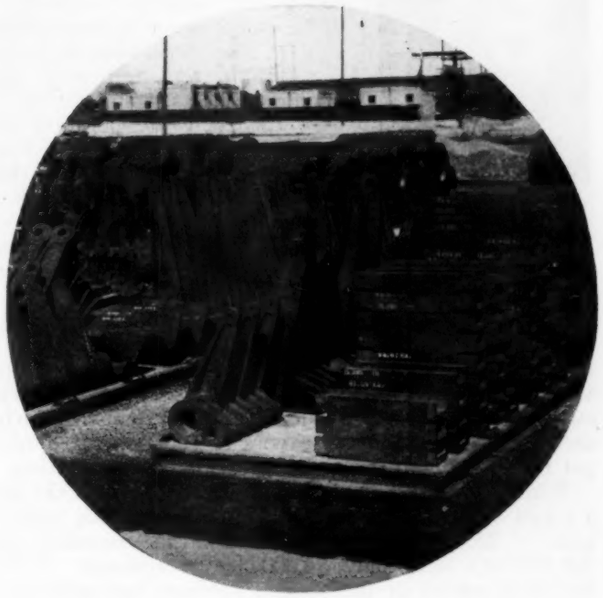
Revenue car loadings at stations in Canada for the week ended September 14 totalled 82,178 cars, an increase over the previous week of 12,059 cars and a decrease from the same week last year of 6,008 cars.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada		
September 14, 1929	82,178	38,695
September 7, 1929	70,119	36,518
August 31, 1929	77,557	39,048
September 15, 1928	88,186	39,934
Cumulative Totals for Canada		
September 14, 1929	2,490,034	1,519,310
September 15, 1928	2,441,976	1,442,142
September 17, 1927	2,262,074	1,389,151



Railway Shop Men Talk Material

Agree that economical shop operations require better supply conditions and offer plan to secure them



THE general shop foremen of the country, at their twenty-third annual convention at Chicago last week, again turned to the study of the supply question as a means of furthering economical and expeditious shop production. For the third consecutive year, an entire session was devoted to the subject. The meeting was addressed by L. C. Thomson, manager of stores of the Canadian National Lines, and a report of a committee of shop men led by F. M. A'Hern, general foreman, Bessemer & Lake Erie, and past president of the association, was read.

Weak Spots in Supply Service

With tons of unapplied material reported rusting on storehouse platforms for want of use on the one hand, and locomotives and cars commonly held in shops a month or more for one or more essential items of material required for their repair, neither storekeepers, shop men nor manufacturers are free from criticism, it was made evident in these discussions. The store department problem was illustrated by the reciting of an instance where a complaint lodged against the store department for a shortage of standard items disclosed that repair work on not less than four hundred cars had been started without the stores department getting any more notice of the work than to see an eight months' stock of center plate castings exhausted in one week. It was also contended that the inspection of the lockers of workmen, and even the desk drawers of shop supervisors, will almost invariably unearth tools and other expensive materials that would better serve the road in toolrooms or storehouses.

On the other hand, the storekeepers were accused by putting too much stress on the amount of stock on hand and failing to appreciate the effect of material delays in disorganizing a shop, with costs which far overbalance any saving in carrying charges made by stock reductions. There is too much lost motion, moreover, in the movement of orders for material from the local store to the purchasing agent, and manufacturers, while ready enough to sell supplies, are too unreliable in delivering them, or at least in living up to specifications which must be met before material can be accepted for use. A feeling that a better service of supply, while essential for economical shop output, can be accomplished without carrying swollen stocks, was general, however, and the keynote of the session was that a better planning of work programs is the way to bring it about.

Not Dollars in a Bank, but They Cost Nearly One Hundred Dollars Apiece, Plus Carrying Charges, Every Month They Lie Idle

L. C. Thomson

Co-Operation Urged

The address of the Canadian stores officer, who is also a member of the executive committee of the purchases and stores division of the American Railway Association, was a message of friendship to shop forces and a plea for their co-operation in solving supply problems. The general foremen, he said, are the ones responsible not only for the labor expended in shop work, but for the proper application and judicious use of material. As much as 69 per cent of a railroad's annual outlay is spent under their direction. This being so, the general foreman's interest in supply work is indispensable to an effective service. Conferences may be held with system officers but always the general foreman must be relied upon to carry out the detailed plans. Whatever the system by which the stores department endeavors to function, it cannot get results without the general foreman's co-operation.

When the Canadian National was formed in 1924, as a result of amalgamating five railroads with an aggregate of 23,000 miles of line, its stocks amounted to $26,000,000, with only $4,000,000 of revenue. With the co-operation of the general foremen and other officers, this stock has since been reduced to $13,000,000, although the revenue has increased to $58,000,000. If all the employees in a railroad could be educated to think of material in terms of its value, there would be less misunderstanding between the stores and using departments and less difficulty in getting supply results.

Mr. Thomson welcomed programming of material needs by shops, but the planning of material must be done more effectively than simply to rely upon field reports of the material needed. The road foreman's report of work needed on locomotives is not sufficient, having constantly resulted in ordering materials which later developments proved were not required.

Too Much Guess Work About Material

In its report, the committee vigorously advocated a more effective planning of car and shop material programs than exists at present, as a means of improving shop output, and offered a specific plan for adoption by railroads. This report is presented in part as follows:

Unless there is advance planning of locomotive and car maintenance programs, the necessary materials, other than those of a standard nature, must either be ordered largely by guess work, or as the work progresses. The first course means an excessive amount of slow-moving materials, the other, delays to shop operation. Either course, directly or indirectly, is certain to increase maintenance of equipment costs, and eventually is reflected in net earnings. A rapid turnover of materials, with idle items at a minimum, is the objective of the storekeeper. Suitable materials available when and where needed is the requirement of the shop man. To attain or even partially to attain this goal, a definite understanding and co-ordination of effort must exist between the two departments.

Can Eliminate Delays

Material delays may be practically, if not entirely, eliminated by advance planning. The fact that material delays are avoided while a satisfactory turnover of material is being secured, is proof that it is the most economical, as well as the most satisfactory method of carrying out repair programs. Delays for materials are usually caused by lack of a sufficient time interval between the forwarding of information covering the mechanical department needs and the date when it is proposed to apply the material. Standard materials are an exception. These are the materials generally used on all classes of locomotives or on all classes of cars. Such items, when kept in stock and ordered by the purchases and stores department in the usual manner, will be rapidly depleted, however, if an unusual amount of any item is drawn during the course of repair programs. This may be avoided by treating these as special materials.

Advance Information Needed

Authorities agree that the purchasing and stores department should have at least 90 days' advance notice of the plans of the mechanical department for the accumulation of materials for a repair program. A form of report is shown that has proved an aid in this work.

Mr. ..... Division Storekeeper.
In addition to material ordinarily used, the following finished material is anticipated in connection with Class ..... Repairs to Engine No. ..... at ..... shops.
Scheduled into shops ....., 192... Out of shops ....., 192...

Description of Material	Pattern	No. Req.
Right cylinder		
Left cylinder		
Cylinder bushing		
Right guide yoke end		
Left guide yoke end		
Guide yoke cross brace		
Frame cross brace		
Right frame or section		
Left frame or section		
Front deck casting		
Back deck casting		
Link trunion frame		
Wheel centers		
Trailer tires		
Driving wheel tires		
Engineer truck center casting		
Front cylinder head		
Back cylinder head		
Piston heads		
Piston rods		
Front flue sheet		
Back flue sheet		
Inner throat sheet		
Door sheet		
Side sheets		
Crown sheet		
S. H. flues		
Boiler tubes		
Arch tubes		

This locomotive has the following special equipment:
Type of stoker
Type of feedwater heater
Type of reverse gear
Type of superheater
Type of valve gear
Type of A. T. C.
Please advise if the above material will be available for this locomotive.
.....192..... Signed .....

Some roads include driving box shoes, driving box crown bearings, driving box wedges, superheater units and main road bearings, and when a firebox renewal program is contemplated, include the sizes and lengths of staybolts and crown bolts, and even include rivets, if these materials are purchased from outside concerns. Some roads keep a cylinder for each type of their most active locomotives in stock at all time. Some roads depend entirely upon the mechanical department to forecast the issues of tires from month to month.

In addition to giving the stores department 90 days' advance notice, conditions should be checked 60 days and 30 days prior to the proposed shopping date for any additional developments not included in the original report of materials required, and when a locomotive is delivered to the shop, stripping and inspecting it promptly will greatly aid the stores department to avoid a delay.

Programs Need Better Support

A material program, to be effective, should originate either with some designated officer, or with a committee empowered to assign the locomotive and car work, and

Several Acres of Materials for Use on Cars, Some of Which Are Surplus from Imperfectly Planned Repair Programs

the information should be passed to all subordinate officers until it reaches the department directly responsible for the application of the material. Each officer should enlarge upon the detailed information in order to round out a complete program. Suitable forms should be provided, delayed materials, traced and forwarded, and any material to be finished before the shopping date should be in the proper department sufficiently in advance of the work so as not to interfere with it.

Where repair programs are carried on in this manner, there is a tendency for the mechanical department to anticipate the use of too much, rather than too little material. A careful check of the actual requirements per unit against the forecasted requirements, together with a list of the idle material accumulating, will serve to show what revisions should be made in the material program.

Segregate Work by Classes

Where an entire class of locomotives or cars are being repaired at the one point, the delivery of material may usually be halted until the material first considered necessary has been applied. Likewise, where certain classes of equipment have been assigned for shopping at a given date, and the shopping date has been delayed, revisions of delivery programs may be accomplished more readily where the repairs are centralized at a given point.

Unforeseen equipment failures, the necessity for transferring certain types of equipment from one division to another, the necessity for keeping equipment in service even after the shopping date has passed, deferred deliveries from supply companies, together with mistakes, interfere with the operations of the best laid plans. However, there is a definite trend toward improvement in material conditions where advance planning is practiced. No mechanical man need be told the cost of delays for material, but all mechanical men do not fully realize the cost of carrying materials awaiting application, which amounts to 18.84 per cent, as shown in the *Railway Age* of June 22, 1928.

Condemn Letter Writing

In discussing the committee's report, W. S. Morehead, assistant general storekeeper on the Illinois Central, emphasized the importance of the personal contact between local supply officers and shop forces at all times to secure the best results in promoting equipment repair programs or any other work in the shop requiring supplies. A constant source of trouble, he contended, is the habit of officers to write letters to each other instead of to iron out their troubles in conference. It is indispensable to efficient supply service that a supply officer should get into the shop regularly to get the viewpoint of the shop officers and the shop officers in turn should follow the same practice. On the Missouri Pacific, according to W. J. Stothers, the local shop forces have been co-operating closely with the local supply forces in reducing both the stocks of material and the delays to the equipment resulting from shortages of material, while on the Baltimore & Ohio, according to A. H. Keyes, the general foreman's interest in material is evidenced by the fact that he sees all requisitions, and an effort is also made to anticipate all special material necessary for car programs at least 60 days in advance. On the Chesapeake & Ohio, according to L. B. Downey, delays to equipment repairs are being controlled satisfactorily by the practice of repairing all locomotives and cars on a definite program. The mechanical engineer prepares a detailed bill of material well in advance and the progress of the work is followed up closely in conjunction with the storekeepers and supplementary reports made periodically to cover any new developments calling for any changes or additions in the bill of material or the delivery dates.

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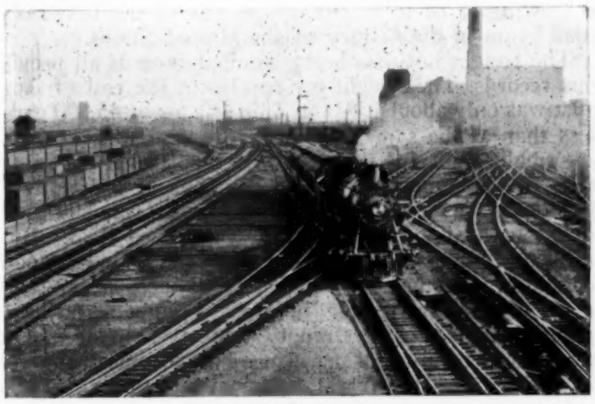

A Westbound Wabash Passenger Train at Chicago

Traveling Engineers' Convention

Opening sessions at Chicago addressed by Samuel O. Dunn and L. K. Sillcox—Six committee reports presented

MEMBERS of the Traveling Engineers' Association gathered for their thirty-seventh annual convention at the Hotel Sherman, Chicago, September 24 to 27, inclusive, the opening sessions being addressed by Samuel O. Dunn, editor of *Railway Age*, and L. K. Sillcox, assistant to the president of the New York Air Brake Company.

The meetings were conducted under the leadership of President James Fahey, traveling engineer, Nashville, Chattanooga & St. Louis, Nashville, Tenn., and the usual active discussion took place on the floor of the convention. Six Committee reports were presented on the following subjects: "To What Extent Have Modern Appliances Contributed to Economical Operation of Locomotives?", Chairman, E. R. Boa, road foreman of engines, New York Central, Buffalo, N. Y.; "The Better Utilization of the Steam Generated by the Locomotive in Heating and Ventilating of Passenger Cars", Chairman, T. W. Kennedy, assistant air-brake lubrication and heating engineer, Illinois Central, Memphis, Tenn.; "Preparation and Testing of Air Brake Equipment to Insure Proper Train Handling", Chairman, W. E. Vergan, supervisor of air brakes, Missouri-Kansas-Texas, Denison, Texas.; "Utilization and Conservation of Available Coal and Oil as Locomotive Fuel", Chairman, J. W. McIlvaigh, road foreman of engines, Missouri Pacific, St. Louis, Mo.; "History of the Traveling Engineers' Association from Its Inception to Date", Secretary W. O. Thompson, equipment assistant, New York Central, Cleveland, Ohio; "Progress in Construction and Operation of Locomotive Mechanical Stokers", F. P. Roesch, Standard Stoker Company, Chicago. Abstracts of some of these reports of the principal addresses will be published in this and subsequent issues of the *Railway Age*.

Railway Situation Best In Years

By Samuel O. Dunn

Editor, *Railway Age*

From the standpoint of the public, of the railway employees and of the railways themselves the year 1929 is proving to be in most respects one of the best railroad years in the history of the United States.

The freight business being handled exceeds all previous records. The freight-car surplus at the end of August was only about 158,000. This was about 45,000 cars less than at the same time last year, and was, in fact, the smallest surplus that has been reported at the same time of year since 1923. The number of locomotives in storage was less than 5,000, which also was less than it has been at the same time of year since 1923. But railway equipment was never as good or in as good condition as it is now. Locomotives are larger and more efficient than ever before. Freight cars have greater capacity and strength than ever before. On September 1 only 12.4 per cent of the locomotives were in bad order—the lowest figure ever reported. Only a little over 6 per cent of the freight cars were in bad order—as good a situation as ever existed at this time of year. All requirements of shippers for cars are being fully met, and, although the peak of the traffic has not yet been reached, there does not seem to be any danger of a car shortage this year. The reliability and speed with which freight is being handled has never been equalled.

For this kind of service the public is paying the lowest average freight rate since 1922. It might be added that it is collecting taxes from the railways at the rate of $30,000,000 a year more than ever before. The kind of freight service that is being rendered is one of the principal factors contributing to the unprecedented prosperity now prevailing, and is of almost incalculable value to the public. When we consider the great value of this service, the rates for which it is being rendered, and the taxes the public is collecting from the railways, we begin to appreciate the huge benefits the public is deriving from efficient railway management and operation.

One of the results of the great increase that has occurred in railway efficiency has been a large reduction in the number of employees. The record-breaking traffic of the first six months of this year was handled with fewer employees than in any year since 1922; but the conditions of work for railway employees are better in every respect than they ever were before. Furthermore, they are being paid the highest average wage ever paid in any year, excepting 1920, and many of them are being paid more than in 1920.

Net Return of 5.6 Per Cent Being Earned

The railways themselves are earning net return at the annual rate of about 5.6 per cent on their property investment. This figure has not been equalled in any year since 1916. The railways of the southern group are not doing as well as in some other years since the war, but those of the east and west are doing better than in any year since 1916. Market prices of railway stocks are the highest in history. This is partly due to unusual stock-market conditions, but it is also largely due to the ability and conservatism with which the railways have been financed for years, and the comparatively large earnings being made.

This is a different picture of the railway situation from any that could have been painted for many years. The improvements in passenger and freight service and in financial results that have been made are mainly due to the great progress that has been achieved in recent years in increasing the efficiency of operation. In 1923 the consumption of coal in freight service was 161 pounds per 1,000 gross ton miles, while in 1928 it was only 127 pounds, and in 1929 a still better record is being made. In 1923 the average freight train carried 713 tons of freight and moved about 11 miles an hour, and therefore produced 7,770 ton-miles of freight service hourly. In 1928 the average freight train carried 793 tons of freight and moved 13 miles an hour, and therefore produced 10,205 ton-miles of freight service hourly, an increase of 31.5 per cent. In June, 1929, the average freight train moved 13.4 miles an hour and

rendered 11,015 ton-miles of freight service hourly—the best record ever made in any month, and an improvement of 36 per cent over the performance in the corresponding month of 1923.

Such figures as these explain the huge economies that have been effected by the railways, as a result of which they have gained for themselves an increased net return while, at the same time, rendering better service at lower rates and paying higher taxes and wages. Making allowance for the advances in wages that have occurred, there have been effected during the last six years economies in operation on the railways as a whole equivalent to a saving of more than $750,000,000 annually. These economies have been due to improvements in operating methods, to better work by the officers all along the line, including especially supervising officers such as traveling engineers having immediate direction of employees, and to the greatly improved morale of employees.

In one sense these economies have had to be paid for. To accomplish them there has had to be made a new investment in railway properties of about $4,500,000,000, which has been used to reduce grades, eliminate curvature, enlarge terminals, install block signals, purchase larger and better equipment, and in a multitude of other ways. Even after allowing for a fair return upon this additional investment, however, there is left a large saving in which the railways are sharing in the form of increased return upon their previous investment, the public in the form of lower rates and higher taxes, and the railway employees in the form of higher wages.

Adequate Capital Investments Primary Requisite

The one outstanding fact which the improvement in railway results emphasizes is the desirability and necessity, from the standpoint of all concerned, of giving the railways opportunity to raise and invest all the capital required to expand and improve their service and make savings in labor, fuel and materials. The possibilities of improvement in railway service and of economies in operation are far from exhausted, but they can be realized only by the investment year after year of large amounts of new capital. The required capital cannot be raised unless the railways enjoy reasonable prosperity, and the fact should not be disregarded that their present comparative prosperity is being enjoyed in a year of unprecedented business activity and record-breaking freight business. Like other industries, they are bound to have their bad years as well as their good years, and they should be allowed, while business is good, to get ther properties and their finances in condition to bear the stress of the poor years that are sure to come in future, as they always have in the past.

To continue to get good results the railways must continue to be well managed and operated, and there is no class of men in their service upon whom they can more confidently rely to help them to do so than those who directly supervise the operation of locomotives. The locomotive is the power plant of the railways. It might be said with little exaggeration that every improvement made in railway physical properties or operating methods is made for the purpose of enabling locomotives to pull longer trains at higher speeds without any corresponding increase in fuel consumption. The railways owe a real debt of gratitude to the traveling engineers for the remarkable increase that has occurred in the efficiency of utilization of locomotives.

Ceaseless efforts must also continue to be made to influence public sentiment on behalf of government regulation which will be conducive to improvements of service and increases in the economy of operation, for all efforts to manage the railways efficiently can be defeated by unwise and unfair regulation. Public sentiment is now more favorable to the railways than it has been in many years; and on the whole, there seems more reason to anticipate the future of the railways with cheerful confidence than there has been at any time in a quarter century.

Trains of Tomorrow

By L. K. Sillcox
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During the lifetime of the few generations just past, the sphere of the ordinary man was narrowed by the limited means of transportation and communication. The physical radius of the usual existence has been enormously enlarged by economical and rapid transportation service with the universal distribution thus brought about, particularly, in recent years. Only in name and elementary principles is the railway of today identical with the railway of 1870. The adoption of the air brake, train control, modern signals and automatic couplers has made possible a vast increase in the capacity of motive power and cars. These, with the related advances in roadbed, structures and a multitude of other improvements, have served to transform our transportation service.

The existing attitude toward accidents, adopted by the present railway administration of the land and the federal government, has made for safe and properly disciplined service. Selfish standards have been cast aside for those which are motivated by public welfare and tend toward the constant upgrade of progress.

There is a lesson to learn from a study of the operating results of Class I railroads, 1920 compared with 1928, if we aim to picture an answer to the thought of what our "Trains of Tomorrow" shall be, even if we extend our gains only at the same relative rate that we have in the past nine years, as shown in the table.

Operating Improvements Since 1920

	1920	1928	Per Cent Inc.	Per Cent Dec.
Total gross ton-miles (100,000)	913,851	1,105,506	21.0	...
Total train-miles (1,000)	633,527	601,468	...	5.0
Total train-hours (1,000)	61,429	46,741	...	23.9
Total locomotive-miles (1,000)	718,605	680,413	...	5.3
Total tons of fuel (1,000)	89,925	79,311	...	11.8
Average train speed	10.9	12.9	18.3	...
Average tons per train	1,442	1,827	26.7	...
Gross ton-miles per train-hour	14,877	23,653	59.0	...
Gross ton-miles per locomotive-day	108,119	143,024	32.3	...
Average tractive force of locomotives	41,443	49,553	19.5	...
Average hours on train per active loco.-day	7.27	6.04	...	16.9
Average lb. of fuel per train-hour	2,928	3,393	15.9	...
Average lb. of fuel per train-mile	283.8	236.6	...	16.3
Average lb. of fuel per locomotive-day	21,470	20,513	...	4.4
Average lb. of fuel per locomotive-mile	252.3	233.1	...	7.6
Average lb. of fuel per locomotive-hour	2,967	3,396	14.4	...

With an increase in volume of traffic amounting to 21 per cent it was possible to secure 26.7 per cent greater train loading, with 18.3 per cent higher speed, and locomotives averaging an increase in tractive force of only 19.5 per cent. These factors actually brought about a decrease in train-miles of 5 per cent, in train-hours of 23.9 per cent, in locomotive-miles of 5.3 per cent and tons of fuel consumed of 11.8 per cent, with the unit rates of fuel affected accordingly.

Of the numerous factors that are discussed by the railroad operating staffs in connection with the more efficient handling of train movement, it is found that the carrying capacity of any section of track is increased by greater uniformity in train speed, a feature often disregarded by those insisting upon passenger travel at an ever-increasing average speed. Intensive passenger-train movement is one of the causes also of

the continuous effort being made to accelerate the movement of freight trains.

The increase in train speed, which has been brought about in recent years, was accomplished not only by the use of modern locomotives, but by a reduction in the number of stops and delays, with but relatively little increase in running speed. Another outstanding feature appears from a study of the average time active locomotives are employed per day hauling trains, which in many cases is less than the basic day, showing that there may be a considerable loss resulting from improper spacing of terminals to allow full use of the motive power over a longer stretch of track when running even at present speeds.

There are many unnecessary irregularities in train speed which can still be largely eliminated through physical improvements to property. Where a railroad is able to secure money for improvements in grade and alignment, the returns generally have been good. Railroads operating west of Chicago, for instance, constructed originally to develop new territory, were built as economically as possible. As the country became populated and large communities grew up, resulting in increased business, it became necessary and desirable to improve railroad properties, especially in alignment and grades. In addition, it has been necessary to strengthen and improve the track on some of the original locations in order to permit the use of heavier loads and higher speeds. On the other hand, railroads in the eastern section of the country are not often able to consider any change in line because of already serving very important communities along their main lines, and only through the consolidation of various railways can new or advantageous through routes be established in a practical manner. However, they can generally select terminal locations which will adequately meet present day necessities and provide for the most intensive utilization of their organization and plant.

Efficiencies Compared on Train-Hour Basis

It is not strange that in present circumstances, we look mainly at the element of speed, and compare the efficiency of operation of various railroads by the tons moved per freight-train-hour, because it focuses attention on the ever present need for using everything that we have in a most effective way. The result of such a trend has been to compel the use of heavier roadway construction in conjunction with many other features such as the necessity of strengthening bridges, as well as the provision of suitable warning signals at highway crossings or grade separation where justified, with a view to avoiding grade-crossing accidents and interruption and interference with train movement.

Hardly any department of railroading has made greater progress than in the realm of signaling. The objective at first was to obtain safety, as the speed and weight of trains increased. Now it may be regarded as one of the most important means whereby economy and increased capacity may be obtained. Whereas originally safety was insured by a time interval between trains, the signal system now aims at a space interval and endeavors to keep trains moving.

We are engaged in a period when the most careful thought is being given to the possibility of improving terminal and other railway facilities in this country. Interest necessarily attaches to outstanding examples of railway betterments, particularly when it is realized that they have been concluded in such a manner as to yield a direct monetary return on the capital invested in economies in operating expenditure.

The application of electricity to train haulage presents many problems not the least being that of reducing energy demands to the lowest limits consistent with maintenance of the requisite service. It will be readily understood that between main-line and suburban service there is a decided difference. For the former, the motors are designed for an output corresponding to the hauling of a specified train weight at a given speed over the most difficult section of line to be negotiated. On the other hand, in the case of suburban trains, much of the energy is consumed during the period of initial acceleration and this acceleration has a tremendous influence on the choice of motors and upon energy consumption. For long-distance non-stop train movements, the maximum speed of a train does not greatly exceed the mean, and the accelerating period is not of much concern. It is quite otherwise with suburban service, for here the maximum economical acceleration and braking are sought in order to keep the mean speed as high as possible. In any case, the mean speed will be considerably less than the maximum.

Striking changes have taken place in the field of transportation during the past nine years, and if the same trend is carried forward, it may be predicted, from a knowledge of the facts, that "Trains of Tomorrow" will operate with still greater success as regards features of average speed attained, average weight per train carried, net revenue tonnage, reliability in operation and over all economy by reason of detailed improvements now in progress or under review, affecting signaling, right of way and terminal location and construction, as well as equipment design. The railway plant will become increasingly better adapted to utilize the potential value of improvements already made, as regards time in active service of locomotives and corresponding tonnage moved. With a decrease in short-haul business, it is realized more clearly all the time how the expense for movement by railway does not grow in proportion to the length of the haul, but in fact tends rather to decrease per unit of distance. The terminal costs form smaller percentages of the total as the distances increase, and, hence, through business will be intensively concentrated upon, and will represent a higher proportion of the total tonnage offered. There will be no escape from the extension of electrification of steam roads in cases where the service or the local conditions justify its use. Significant in this matter is the emphasis it has placed on the need for constantly improving steam locomotives to meet competition from other available classes of motive power which may be substituted therefor, and the fact that greater reserve of capacity is now being considered a prime essential to good service.

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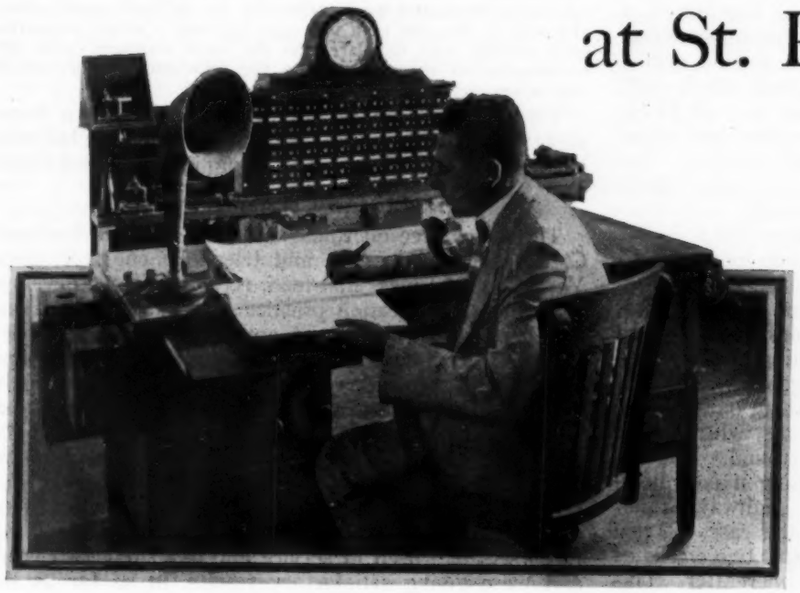
E. P. & S. W. Station at Douglas, Ariz.

Telegraph Officers Discuss Problems at St. Paul Meeting

Newer developments in railway communication equipment studied — Opportunities for increasing efficiency of service emphasized



The Telephone Is Rapidly Replacing the Telegraph for Train Dispatching

IMPROVEMENT in communication plant facilities, better methods of construction and more efficient operating practices formed the major part of the subject matter at the thirteenth annual convention of the Telegraph & Telephone Section, A. R. A., which was held at St. Paul, Minn., from September 17 to 20, inclusive. The four-day meeting was presided over by Chairman J. McMillan, general manager of telegraph of the Canadian Pacific. Several technical papers were presented, as well as reports of standing committees, the most notable paper relating to the principles of television: In this paper, J. O. Perrine, of the engineering staff of the American Telephone & Telegraph Company, outlined in simple terms the fundamental physical and psychological principles upon which television is based.

Chairman McMillan, in a short talk preceding the presentation of committee reports, emphasized the vital part which the communication departments of the railroads play in the business of transportation. And in their constant efforts to provide the most efficient service possible, membership in the T. & T. section is immensely helpful. In this way, he said, communication officers on the smaller railroad systems can avail themselves of the fruits of development work conducted by the larger railroad systems, which are better able to carry the burden of such research activities.

The registration showed that 184 members and 36 visitors attended the sessions. The Committee of Direction decided at the close of the fourth day's session to hold the 1930 annual meeting at the new Royal York hotel, Toronto, Ont., during September 16 to 19, 1930, inclusive. The newly elected officers for 1929-1930 are: Chairman, P. F. Frenzer, superintendent of telegraph, Union Pacific; first vice-chairman, J. L. Niesse, superintendent of telegraph, Cleveland, Cincinnati, Chicago & St. Louis; second vice-chairman, C. A. Plumly, superintendent of telegraph, Baltimore & Ohio. The following men were elected to membership on the Committee of Direction: H. A. Shepard, general superintendent of electric transmission and communication, New York, New Haven & Hartford; J. F. Caskey, superintendent of telegraph, Lehigh Valley; J. B. MacGregor, superintendent of railway telegraph service, Grand Trunk; J. A. Jones, general superintendent of telegraph, Southern; A. W. Flanagan, superintendent of telegraph, Southern Pacific; and J. C. Rankine, superintendent of telegraph, Great Northern.

The investigation of various methods of treating poles and timber used in telegraph and telephone construction, the collection of service data with respect to treated poles, and the consideration of the practicability of pole hole-boring and pole-setting machines were the high spots of the report of the Committee on Construction and Maintenance of Outside Plant, of which H. A. Shepard, general superintendent of electric transmission and communication, New York, New Haven & Hartford, was chairman.

In respect to wood preservative methods, the committee referred briefly to termite tests now being conducted in the Panama Canal zone. In January, 1928, a considerable number of pine stubs, eight inches in diameter and three feet long, were set in a test ground on Barro Colorado island in the canal zone. The installation was made under the direction of Dr. T. E. Snyder, senior entomologist, U. S. Department of Agriculture. The first annual inspection of this installation was made in February, and March, 1929. While the government will not issue a report of this test for several years, it is stated that the ZMA (zink-meta-arsenite) stubs were entirely free from termite attack and in perfect condition, whereas the untreated stubs had been so completely destroyed by the termites, that they were removed from the tests. The severity of termite attack in this test was so great that the results already give definite evidence of the termite resistance of "ZMA" timber.

P. J. Howe, construction engineer of the Western Union Telegraph Co., reported on the current status of the ZMA (zinc-meta-arsenite) preservative treatment for pole timbers. He mentioned that western cedar and other pole woods were being treated commercially, although not as extensively as yellow pine which was the first timber so treated. The Canal zone tests referred to in the preceding paragraph were conducted under the most unfavorable service conditions that might be met with in practice, the rainfall in that region exceeding

100 in. annually. He also stated that the ZMA treatment did not accelerate the "checking" of poles and that it compared favorably with other preservatives in this particular respect.

The economics of pole hole-boring was considered at length. It was reported that, in a recent construction job in Eastern Montana, the Northern Pacific drilled holes for poles and anchors with a Buda earth drill hauled by a Ford tractor at an average cost of $1.41. This cost included labor, supplies, repairs and fixed charges on both the earth drill and the tractor. The territory where this drill was employed was rather rough and irregular and was not altogether ideal for such service. The experience of the Great Northern with a similar type of earth drill over a period of seven months indicated an average cost per hole dug of $0.92. This resulted in an actual saving of more than $800, as compared with the cost of digging the holes by hand. In this case, the machine was used in a rolling prairie country in Central Montana, where the digging was practically all in gumbo with some gravel. About one-half the work was done during the winter months, when it was necessary to dig through frost in the ground. The experience of the Great Northern in using a pole hole-digging machine manufactured by the Highway Trailer Company, was also reported upon. In this case, the cost per hole averaged 95 cents during the first two weeks of operation and slightly less than 92 cents thereafter. This cost included that of digging the hole and raising the pole, but it did not include the cost of setting and tamping.

J. C. Rankine, superintendent of telegraph of the Great Northern, supplemented the data in the printed report by stating that it was found that the cost of using pole hole-boring and setting machines was actually about 10 per cent less than indicated in the report, because the figures given therein were based only on six weeks' experience with these machines. He also stated that these machines can be used for 8 months of the year and that, notwithstanding the unproductive time of such equipment, it was possible to do the work at a cost less than half that of manual digging and setting. This estimate was based upon using a three-man crew with each machine. When used under average soil conditions and in fairly level territory, it was possible to dig the holes and set the poles at the rate of four per hour. This rate includes the time needed to transport the machine from one location to the next.

Signal Wires on Communication Pole Lines

The subcommittee on aerial construction submitted a specification covering the attachment to communication pole lines, of railroad signal, automatic train control, battery charging and other circuits of similar character, where the voltage does not exceed 550 between conductors, and where the transmitted power does not exceed 1,600 watts. The specification stipulated, in part, that:

Signal wires carrying more than 250 volts, or 150 watts, shall be carried only on crossarms used exclusively for railroad signal wires, preferably above the highest crossarm carrying communication wires. In such cases, a minimum spacing of four feet shall be maintained between the crossarm carrying such railway signal wires and the crossarm carrying communication wires below. Where the use of the upper position is impracticable, the crossarms may be placed not less than two feet below the lowest communication crossarm. Where more than one signal crossarm is installed, such signal wires shall be placed on the lowest through signal crossarm. In every case where such signal wires are carried below the communication wires, they shall occupy the two adjacent end pin positions of the crossarm.

Railroad signal wires carrying more than 250 volts, or 150 watts, when carried below communication wires, as permitted above, shall be rendered conspicuous by painting a stripe on the crossarm, or by the use of insulators of different form or color than are used for signal control wires. Signal wires carrying not more than 250 volts, or 150 watts, shall normally be carried on crossarms used exclusively for railroad signal wires, although in the case of a line carrying only a single crossarm, such circuits may be placed on the same crossarm with the communication wires, providing the attachment of a second arm is impracticable.

This part of the report was presented in a form slightly revised from that printed in the advance bulletin, but was accepted for letter balloting, in the revised form.

Radio and Carrier Current

The Committee on Radio and Wire-Carrier Systems, C. E. Baxter, telegraph and telephone engineer, New York Central Lines, chairman, reported on the development in communication practice between shore stations and harbor tug boats; the application of wire-carrier systems to communication lines along the railroads; and on front-to-rear-end communication on long freight trains, and referred to the Canadian National train telephone service, which was described in an article in the *Railway Age* of May 11, 1929, page 1100. The New York Central has discontinued its study of radio for front-to-rear-end communication on long freight trains at the order of the Federal Radio Commission. These radio sets had been in service approximately two years and were giving satisfactory results, in so far as the radio was involved. It was shown in a preliminary report issued by the New York Central that there was an appreciable saving of road time of trains equipped with radio, attributable to its use for communication between the front and rear ends of freight trains. In its study, no estimate was made of the annual charges incurred in connection with the operation of these sets, or to determine how this affected the operation of other trains following on the same track, or on adjacent tracks when either-direction operation is employed.

There are many uses of the radio which do not cause direct savings in time and are considered more as a convenience, as for example, the explanation of a stop caused by a signal, or the report of hot journals or defective equipment discovered by trainmen on the engine and which can be repaired without assistance from the caboose. Such uses cannot be classed as time savers, but serve to inform everyone of the cause of the delay and of what is going on, thereby obtaining the utmost co-operation and efficiency. This saves needless walking on the part of the train crew, tending to keep them off the right-of-way. The N. Y. C. report also showed an increase in ton-miles per train hour. While the report was not an exhaustive study, it showed that this service had sufficient merit to warrant further investigation.

On July 17, 1928, the Pennsylvania and the Westinghouse Electric & Manufacturing Company made certain tests of front-to-rear-end communication by radio, between Altoona, Pa., and Enola. The train consisted of 130 loaded coal cars, 2 cabin cars and a steel coach, hauled by 2 locomotives. The leading locomotive and the cabin car on the rear were equipped with short wave radio transmitters and receivers. This train traveled through train-control territory and tests were made to determine whether there would be any interference from the train-control system with the radio. The only noticeable effect was that the make and break operations of the train-control coders produced some noise in the radio receivers, but it was not of sufficient intensity to interfere seriously with voice reception. The results of the test indicated possibilities in the successful development and use of radio apparatus for front-to-rear-end communication. although considerably more development work in the ap-

plication of this system to actual road operation must be made.

The Federal Radio Commission has ordered the N. Y. C. to discontinue its radio operations on freight trains between Albany, N. Y., and Syracuse. Radio service from head to rear-end freight trains can be conducted only under the specific authority of the Federal Radio Commission, which body must allocate definite wave bands for such service. To date, this commission has not set aside any wave-lengths for railroad use. C. A. Plumly, superintendent of telegraph of the B. & O., recounted some of the experiences of a recent test of radio communication on his road and pointed out that it was noted that the intensity of the voice signals varied with the location of the line wires which paralleled the railroad. This fact led the test engineers to the conclusion that there is a decided "carrier-current" action on the wayside telegraph wires, whenever a head-to-rear-end radio set is operating. This opinion was concurred in by several others participating in the discussion.

The committee reported that the Canadian Pacific has added about 34,000 circuit miles of carrier-current telegraph since July, 1928, and that this road plans to continue to install this equipment well ahead of the traffic requirements. The C. P. R. carrier telegraph furnishes 10 additional channels from two physical channels (2 wires) and also provides a long distance telephone circuit over the same pair of wires. The railroad has found that the service on the carrier channels is just as good, if not better, than by the use of a straight metallic circuit. During discussion of the report, it was evident that many telegraph superintendents were vitally interested in the C. P. R. carrier-current telegraph system, because they look forward to some such agency being used on other railroad lines where traffic is heavy and terminals far apart. Chairman McMillan (C. P. R.) made it clear that under the traffic and geographical conditions encountered on that system, the use of carrier telegraph is based purely upon considerations of economy. Where transmission over great distances is involved (1,500 miles or more) the carrier system is no more expensive than the common telegraph system. It was disclosed that the carrier system is more immune to service interruptions such as might be expected from neighboring power lines, or from "aurora borealis."

Message Traffic

The Committee on Message Traffic, of which G. D. Hood, superintendent of telegraph, Chicago, Rock Island & Pacific, was chairman, outlined several methods of handling communications in and between yards, terminals and office buildings, stating that it is practically impossible to formulate any rules or specifications for general application. Such factors as volume of business, nature of communications, whether a record is essential, speed of service necessary, distances between offices and character of offices, must be considered.

In general, the means of communication should be commensurate with the needs of the service, and with the assistance to the operation of the railroad which it will render. Two outlying yard offices may perhaps be well served by the use of a generator telephone between them to take care of their occasional and casual exchange of information or instructions. A central yard, with need for communication to several points, may better be served by a small automatic telephone installation, or, if there be need also for general communication to scattered points, by service through a switchboard. A general yard office, having a heavy load of communication and including the necessity for written records, may need some form of printer for rapid work, or may need messengers as auxiliary means of communication.

Most of the discussion on the subject of telegraph printers had to do with the relative merits of page and tape printers. Chairman McMillan said that the real reason for the extension of printer circuits is the improved service to the public. S. L. Van Akin, superintendent of telegraph, New York Central, reported several installations of printers that were resulting in the expedition of traffic. A page printer circuit between DeWitt, N. Y., and New York City is employed for transmitting train consists, some of the reports being three feet long. Three carbons are made at the time the consist is transmitted. He also mentioned that page printers were used at both hump yards at DeWitt, and that duplicate sets of equipment were justified because of the greater assurance of continuous service. Mr. Van Akin also referred to the tape printers (14 in all) used in the New York Central station at Buffalo for issuing information as to train arrivals, and related uses. Tape printers are also being used by the New York Central to expedite the make-up of passenger trains between Mott Haven yard and Grand Central terminal, New York. It was generally agreed that the page-type printer was better suited to hump-yard service than the tape printer.

The representatives of the Western Union reported that their use of printers had more than doubled in the past seven months. One spare printer is provided for each office. Service records indicated that 12,000 to 15,000 messages were handled per trouble call. W. Rogers, superintendent of telegraph of the Missouri Pacific, related the experience of the Missouri Pacific in transmitting train consists. It has been possible to save $10,000 a year by making a $20,000 investment. Page-type printers are used and eight copies are made. (See *Railway Age* of August 24, 1929, page 462).

The Acoustical Treatment of Walls was the subject of a paper prepared by R. V. Parsons, staff manager of the Johns-Manville Corporation. His paper was devoted to the sound-absorbing effectiveness of various materials used for walls, floors and ceilings. Much improvement can be effected in telegraph and telephone offices when walls and floors are acoustically treated. Several telegraph officers supplemented the paper by outlining their experiences with sound-absorbing materials in noisy offices. All of them were agreed that the results more than justified the expense.

Economics of Communication

The economies made possible by the use of telegraph printers, treated poles and joint pole line construction constituted the subject of the report of the Committee on Economics, of which I. C. Forshee, telegraph and telephone engineer, Pennsylvania, was chairman. Replies received from 31 railroads as a result of a questionnaire, formed the basis from which the estimated savings reported upon were obtained. The railroads involved represented 157,871 miles of road. It was indicated that where telegraph printers are used on through or long distance circuits, the average number of messages handled per circuit per month was 19,250. The total annual savings effected by the use of 141 printers on 16 railroads was $235,400, when compared with the cost of handling the same volume of business by Morse telegraph.

Fourteen roads are using 179 printers in local, short haul or yard service. The service in general is faster than the older methods of handling the business. The estimates as to speed of service varied from the same as by telephone, to double the speed by messenger or other means. The service generally is more satisfactory than when handled by previous methods, the errors are less,

yard operation is speeded up and errors in diversions of freight are reduced.

One road reported that, where printers are used for transmitting the switching lists in classification yards, the towers involved get the lists as fast as they are typed on the printer, and as a result great improvement is effected as compared with handling them by typewritten manifold lists delivered by messenger. The actual switching may proceed after two or three cars have been listed and can continue while the lists are being transmitted, so that switching can be completed within a short time after the lists have been transmitted by printer. This faster service effects economies in yard operation, but the saving is intangible and was not included in the economies from this operation as given in the report. The saving in the operation of the printers for this service, as compared with the previous method of operation on 10 roads, was $43,237 per year. In addition there were the intangible savings enumerated and appreciable improvements in the service.

The importance of a satisfactory pole line for railroad communication is quite generally recognized by the different departments of the railroads and especially in the event of failure of the line on account of storms or otherwise. For some years, experiments have been conducted by the railroads and the commercial telegraph and telephone companies, in different sections of the country under different soil and climatic conditions, using different kinds of pole timber, preserving materials and methods in an attempt to prolong the life of wood poles, and to discover the most efficient and economical materials and processes. Creosote has been used most extensively, but other materials have been developed and used and some of them appear to have merit. It was believed that the replies to the questionnaire were based largely upon the results obtained from the use of creosote, but some of the more recent installations have used other preservatives.

Twenty-six companies reported using 1,089,803 treated poles, with annual savings, as compared with the cost of untreated poles, of $183,245. The savings per pole, per year, varied over quite a wide range for both butt-treated and full-treated poles, probably on account of variations in the cost of untreated, butt-treated and full-treated poles purchased at different times, and also because of different labor costs and other items considered in the cost of poles in place. The average saving per pole was $0.168 per year. It was believed that this figure was conservative and that the actual economies might exceed those shown in the report.

There is further merit in the use of the treated poles that give the longer life, than just the annual savings indicated. When line wires are transferred to new poles, the wires may be damaged, which may be responsible for the failure of the wire later when stressed by ice and wind loads, or by low temperatures. There are further advantages, arising from less frequent work on the line to renew poles, because such work usually causes some circuit interruptions. There is also a saving in labor cost by reason of less frequent handling of the wires. The reports from 23 roads showed a total of 1,608,838 railroad-owned poles and 1,016,685 poles in joint-ownership lines as being untreated. "The possible economies from the use of treated poles, when these are renewed, are worthy of serious consideration," stated the report of the committee.

Joint Line Construction

The questionnaire was intended to develop also the savings which have accrued to the railroads as the result of using the type of pole line construction approved by the National Electrical Safety Code and certain state rules, through the sponsorship of the T. & T. section. These construction standards provide for the installation of signal circuits, operating at not more than 550 volts and transmitting not over 1,600 watts and located on signal arms below the communication wires of a common pole line. Seventeen roads reported using this type of construction on 17,139 miles of line. If this type of construction were not permissible, it would be necessary to provide either a separate pole line, or higher poles and to place the signal power circuits four feet above the communication wires. The answers submitted varied over wide limits, probably on account of different assumptions, and varying numbers of communication wires involved, requiring different lengths and numbers of poles and guys per mile, as well as different labor and material costs, etc. However, careful analysis of all data available led the committee to the conclusion that if it had not been permissible to place the 1,600-watt power wires below the communication wires with standard crossarm spacing, the increase in cost would have been approximately $20,600,000 for the 17,139 miles reported upon.

Other Committee Reports

The latest developments in communication apparatus and practices were reported upon by the Committee on Communication Development, of which J. A. Jones, general superintendent of telegraph, Southern, was chairman. One of the items in this report related to a new type of steel-armored cable recently installed for use in telephone circuits. Detailed specifications covering such inside plant facilities as a relay rack, lamp panel, resistance mounting, message racks, test panel units and associated equipment, were submitted by a subcommittee of the Committee on Construction and Maintenance of Inside Plant. It was brought out during the discussion that the improved type of telephone service jack for observation and business cars is similar to that employed in train control for making connection between the engine and tender.

The Committee on Protection against Electrolysis reported that one of the large wire-using companies has developed an electrolysis protection unit to be connected in drainage circuits to reduce electrolytic corrosion. The Committee on Electrical Protection reported that properly designed and installed pole arresters can be of considerable benefit in reducing service interruptions caused by the operation of standard protective devices. E. J. Agnew of the Western Union Telegraph Company presented a paper on the subject of "Grounds" both for protective purposes and for service use. He referred to various types of grounds and to the large variation in the resistance of grounds, even when located in close proximity. The importance of ground resistance measurements was emphasized and the necessity of periodic checks of ground connections was pointed out. The Committee on Education and Training of Communication Employees submitted a set of instructions relating to voice technique. In doing so, the committee indicated that its purpose was to provide means whereby supervisors, instructors, telephone operators, etc., who come in contact with the railroad public, may learn to use the speaking voice with "pleasing and telling effect." The Committee on Communication Transmission submitted a bibliography of technical papers on electrical communication, also technical data relating to transmission equivalents of railroad telephone apparatus and circuits, together with instructions regarding their use.

More than 600 Persons Attend the Annual Dinner

Roadmasters' Association Concludes Convention

L. A. Downs, R. H. Ford, R. S. Belcher and M. M. Backus presented papers and addresses at the meeting

THE proceedings of the opening sessions of the forty-seventh annual convention of the Roadmasters' and Maintenance of Way Association, which was held in Chicago on September 17-19, were reviewed in the *Railway Age* of September 21, page 681 wherein abstracts of a number of committee reports, papers and addresses appeared. The remainder of the convention is covered in these columns, abstracts of two committee reports and four papers and addresses being presented below, including the address of L. A. Downs, president of the Illinois Central, who was the speaker at the annual dinner given by the Track Supply Association to the Roadmasters' Association, in which 632 members and guests paticipated.

In the election of officers, E. E. Crowley, roadmaster, Delaware & Hudson, Oneonta, N. Y., and Elmer T. Howson, western editor, *Railway Age*, Chicago, were advanced from first vice-president and second vice-president, respectively, to president and first vice-president; C. W. Baldridge, assistant engineer, Atchison, Topeka & Santa Fe, Chicago, was elected second vice-president; and T. F. Donahoe, general supervisor, Baltimore & Ohio, Pittsburgh, Pa. and James Sweeney, supervisor, Chicago & Eastern Illinois, Danville, Ill. were re-elected secretary and treasurer, respectively; E. P. Safford, supervisor, New York Central, Silver Creek, N. Y., was elected director for one year (to fill a vacancy) and J. J. Desmond, roadmaster, Illinois Central, Chicago, and A. Chinn, district engineer maintenance of way, Chicago, Burlington & Quincy, Lincoln, Neb., were elected directors for four years.

Chicago was selected as the place of the next meeting. The Committee on Subjects submitted the following topics for consideration at the next convention: (1) The Equation of Track Mileage as a Basis for the Distribution of Forces, (2) Getting the Most from Labor Saving Equipment, (3) The Division of Work Between Section and Extra Gangs, (4) The Use of Motor Trucks in Track Work, and (5) Recent Developments in Roadbed Drainage, with Particular Reference to Multiple Tracks and Yards.

The Production and Care of Cross Ties

By R. S. BELCHER

Manager Treating Plants, Atchison, Topeka & Santa Fe System, Topeka, Kan.

This paper is prepared largely with the thought that ties purchased are to be treated. In a comparatively few years, relatively few cross ties will be installed untreated, and those will be used in special situations. A total of 74,231,840 cross-ties were treated in the country in 1927*. This is equivalent to more than 70 per cent of the ties purchased during that year, so that the question of whether it pays to treat ties appears to have been settled. The Santa Fe has been treating cross ties for 44 years, starting in a small way with the treatment of about 100,000 in 1885, and to date a total of 90,000,000 ties have been treated for it. Ninety-nine per cent of the ties inserted in 1928 in Santa Fe tracks were treated ties, and we estimate that 94 per cent of all the ties under Santa Fe rails are treated ties, the remainder being largely redwood. Our first purchase of creosote in quantity was made in 1905 and to date 122,000,000 gal. of creosote has been received at Santa Fe plants. The general decrease in our tie renewals per mile of track during the past 30 years is evidence of the value of preservative treatment of cross-ties on the Santa Fe.

Ties Now Given Greater Attention

The railways, generally, are spending more money for the conditioning of their ties before treatment than formerly. A greater effort is being made to get the ties out of the woods and into the treating plants without delay where, in general, seasoning can be done more satisfactorily than elsewhere.

* "Quantity of Wood Treated and Preservatives Used in the United States," by R. K. Helphenstine, Jr., United States Forest Service.

Seasoning yards at the treating plants usually are well kept, free from weeds, well drained, and the ties are piled properly. Machine adzing for the tie plates and boring of spike holes prior to treatment is standard practice on many roads and is increasing steadily. Of the 74,000,000 ties treated in the United States in 1927, 28.79 per cent were adzed and bored, 6.14 per cent were bored only and 5.22 per cent were adzed only.

How Does the Well-Treated Tie Fail?

With a view to possible improvement of our tie treatment on the Santa Fe, we have inspected thousands of old ties that have been taken out of track, for the purpose of determining just why they failed. Some ties, of course, show several kinds of failure in the same tie but we have, as far as possible, classified them by what appeared to be the primary reason for failure, under the following heads: Decay, spike killed, shattered, rail cut, plate cut, derailment, split, broken and burned.

Decay, spike killing and shattering account for most of the ties that have come out of our tracks in the past 10 years. Only small percentages are covered by the other headings. Of the untreated ties, 80 per cent were taken out because of decay, 7 per cent were spike killed and 7½ per cent were shattered. Of the zinc chloride treated ties, 60 per cent were decayed, 8 per cent were spike killed and 30½ per cent were shattered. Creosoted ties showed only one-half of 1 per cent decayed, 49½ per cent spike killed and 44 per cent shattered.

Mixture Treatment Reduces Shattering

We use a great many pine and fir ties, and both of these woods shatter badly under certain conditions. We have found that the addition of petroleum residuum, or fuel oil, to either the creosote treatment or the zinc chloride treatment will do a great deal to prevent shattering. As a result of experiments starting in 1909, the creosote-petroleum mixture treatment was made standard on the Santa Fe in 1923. We hope that this treatment, together with the careful distribution of ties of the various woods to those parts of the system where each will give best results, will do much to overcome shattering. A total of 15,791,147 cross ties, or approximately 21 per cent of the ties treated in the United States in 1927, were treated with a creosote-petroleum mixture, 15 railways using this preservative.

The ties which were included in the spike-killed ties mentioned were, in general, ties which had not been prebored for the spikes. We are preboring and preadzing all ties before treatment on the Santa Fe and, as I have already mentioned, this is considered good practice on many of the railways of this country. Without doubt, when the spike is driven into the treated prebored hole, a big step has been taken toward protecting the tie from the crushing of the wood fiber and decay around the spike, in so far as the first spiking is concerned. But what of the numerous other spikings incident to rail laying, regaging, spacing ties, etc.? Ordinarily prebored ties should have four holes bored at each end of the tie. This will permit reversing the spiking at some time during the life of the tie. The additional treatment in the tie by reason of the prebored holes is of much benefit. This additional preservative goes to the spot where it will do the most good—at the rail base. All unnecessary spiking should be eliminated and the necessary spiking should be carried out with greater care than is usually the case. Spikes should be driven vertically, square with and snug against the rail, and where prebored ties are used, it follows that, to obtain the advantages of preboring, the holes in the tie plate must be lined up with the spike holes in the tie so that the spikes may be driven into the bored holes as intended.

When respiking, it is important that a well manufactured tie plug be used. A poor tie plug is, in many cases worse than none and does considerable damage to the tie. It is particularly important that the tie plugs should be uniform in size.

Adzing Ties in Track

In the course of track work, it is often necessary to adze treated ties for plates, gaging to eliminate wheel marks and for other reasons. When this is necessary, the swabbing of the adzed surface with a hot preservative composed of 50 per cent creosote and 50 per cent petroleum residuum, creosote-coal tar solution or straight creosote, will be found good practice and well worth the trouble and expense of the application and of keeping the preservative hot. Several different types of heaters have been developed which are convenient to use.

In recent years, there has been much improvement in tie-plate design, whereas in former years, many ties were taken out of track because of rail cutting or the damage done by small or poorly designed tie plates. Improved track drainage and the resultant elimination of much regaging, the use of improved ballast, rail anchors, tie spacers, and other tools which tend to reduce or eliminate the abuse to which ties were formerly subjected in handling or after they were placed in the tracks, have resulted in added protection to the tie mechanically. Nor should the fact be overlooked that the methods of handling the ties, of storing them, and of placing them in track, have improved. Much of the credit for both the improvements in these methods and in the design of tools and plates, anchors, spacers, etc., should be given to the roadmasters and the track men under them.

Discussion

The discussion of Mr. Belcher's paper consisted almost entirely of questions and answers. To a question as to what can be done to prevent checking of ties before and after treatment, Mr. Belcher replied that it is difficult to prevent natural checking through seasoning, but that S and Z-irons and other anti-splitting devices have been used with considerable success. So far however, no method has been found to overcome small checks, except what can be done by the proper piling of the ties during the seasoning process. Close piling is necessary in dry climates to prevent too rapid elimination of the moisture, while open piling is required in damp climates to stimulate the drying out process. Where S-irons have been applied to restrain checking during the natural seasoning, they continue to function and prevent the checking which occurs during the seasoning process after treatment. Where splitting occurs after the tie has been applied in the track, the most successful method of correction is banding.

In reply to an inquiry about how soon after treatment ties should be inserted in the track, and whether they should be seasoned at the plant or along the line. Mr. Belcher indicated that he favors seasoning at the plant, where the process can be controlled and where it is carried out under the most favorable conditions, but that conditions do not ordinarily permit of storing ties after treatment.

Subsidized Competition

By L. A. Downs

President, Illinois Central

Mr. Downs reviewed the history of railway transportation in the United States, dividing it into the four periods,—pioneering, ending in 1887; regulation, from 1887 to Jan. 1, 1918; government control; and reconstruction, from March 1, 1920 to date. With this background he took as his primary theme, the question, "What of the Future?" His answer to this is abstracted below:

What of the future? Business men should be told that that is a question that they, not we, must answer, and their answer depends upon the attitude they will take towards various forms of other transportation. I refer to transportation by air, by highway and by inland waterways. The transportation by air is in its infancy. Aside from its use for pleasure and experiment and in a few passenger-carrying lines, the only real commercial benefit so far is the carrying of the United States mail. The assistant postmaster general, in testifying a short time ago before a committee in Congress, stated that the United States government was losing between five and seven million dollars a year in carrying mail by airplane, and that it was costing a dollar for every fifty cents that was received. Why should the United States government pay the balance if anyone wants to send a letter by air mail? However, even though the government is subsidizing airplanes, I see no serious competition with the railroads on that score.

Competition on the Highways

The second form of competing transportation is that on public highways. Since 1920, railway passenger earnings have gone down tremendously. In 1920 they were $1,280,000,000; in 1928 they were $900,000,000, a loss of nearly $400,000,000. My own railroad has lost $11,000,000 in passenger revenue. These are losses that in my judgment never will be recovered. They

are due mostly to the private automobile and the private automobile is here to stay.

But the greatest menace to the railroads is the trucks and buses engaged in common-carrier service. I believe that buses and trucks should be regulated for the same good reason that the railroads are regulated, not for the purpose of driving them off the highway, but for the purpose of fostering them, so that when they survive under regulation they can be coordinated with the railroads and be employed where they are a public necessity and be kept off the highways where they are not.

I believe, also, that the buses and trucks, in addition to paying the regular license fee that private automobiles and other trucks pay, should pay a tax that would replace the highways that they wear out. There is no reason why the government should furnish a business facility for any business man to use without paying for it. There is no more reason for that than for the state to let any business man go into a court house or a city hall and set up his wares so as to be able to sell cheaper than an adjoining merchant. I am sure that this regulation is coming—motorists themselves are demanding it because these heavy trucks and buses are in their way on the highway—and when it comes and they are forced to pay the amount that is necessary to replace the highways that they wear out, I have no fear that there will be any serious competition from common carriers on our public highways.

Subsidized Water Transportation

Then there are the inland waterways. Much has been said in the papers about the big profit made by the federal barge line on the Mississippi and Warrior rivers. Here are what these profits were in the last five years. I mean the net operating income, or the amount taken in, less the expenses: In 1924 they lost $532,611. In 1925 they lost $34,519. In 1926 they made $213,197. In 1927 they lost $21,808. In 1928 they made $327,712. So for the five years they lost $48,029. Then, at the end of 1928 when there was a "profit" of $327,712, every paper in the United States told what a lot of money the barge line was making and urged that it be expanded to all the rivers.

Now, what of that $327,712? You will find that the barge line didn't pay any taxes. If the barge line paid taxes in proportion to what the railroads pay, say five per cent of its revenue, (the railroads pay more than that) it would have paid $335,379 in taxes. If it had paid interest on the value of its equipment or on the money invested, as any private concern would have to do, five per cent on that investment would be $826,955. So in all, if the barge line had paid taxes and interest last year, instead of a profit of $327,712, there would have been a loss of $834,622.

Who paid the loss? The people who paid the loss are the people you should talk to in your public relations work. Every man who pays taxes paid that loss. The newspapers will tell you it cheapens transportation, it saves the shippers 20 per cent. Nothing is more true than that; it does save them 20 per cent, because that 20 per cent is less than the freight rate. But who pays the collections taken in Oklahoma, in Tennessee, in Washington and in Montana from all the people in the United States to help the shipper who uses the barge line?

The man who uses the transportation ought to pay the full value of it. Do not misunderstand me. We are not opposed to transportation by air or on the highways; we are not opposed to inland water transportation. I am only opposed to the government subsidizing this transportation at the expense of the railroads.

If the Railways Were Also Untaxed

The Class I railroads in the United States paid $376,000,000 in taxes last year. Now, if they were untaxed like the barge line, they could have reduced rates on all freight traffic eight per cent with no loss in net revenue. If they didn't have to pay interest and dividends representing the hire of property used, they could have saved $118,000,000. If, like the barge line, they didn't have to do that, they could have reduced rates 24 per cent without loss of revenue.

The barge line pays nothing for maintenance of way. But just now the government has all sorts of equipment at work below Memphis, taking the snags out of the Mississippi river. No doubt it is spending $10,000 or $20,000 a day to provide a channel for the barges. That isn't charged up to the barge line at all; that is a government appropriation. But if the railroad has a washout you know who pays to put the line back in service. The barge line does not take care of maintenance at all, but it cost the railroads of this country $868,000,000 last year.

Now, if, like the barge line, the railroads didn't have any maintenance charges, they could have reduced the rates on all traffic 19 per cent. Therefore, altogether, if they paid no taxes, no return on property used and no upkeep, just as the barge line does, they could have reduced all rates on freight traffic 51 per cent without any loss in net revenue.

But the people of this country don't seem to think about that. They just think about the cheaper rates that they will get by barge lines. So, as I said about the barge line and the traffic on the highway and by the airplane, if the government will keep out of it and make every shipper pay exactly what it cost him to ship, I have no fear of the railroads in this country.

We have nothing on the horizon that bothers us now, except these three kinds of transportation, and just as soon as the American people understand just what these newspapers and the politicians are talking about, I am willing to leave the fate of the railroads to the people. It is time for the people to think that the railroads are their railroads. They don't belong to anyone else. They are an integral part in everybody's business.

Methods and Costs of Controlling and Eliminating Weeds

Following is an abstract of the report of the committee on methods and costs of weed control and elimination, of which A. Chinn, district engineer maintenance of way, Chicago, Burlington & Quincy, was the chairman:

It is generally conceded that one of the best ways to keep weeds out of the track is to have a good grade of clean ballast. However, dirt starts to collect in ballast as soon as it is installed and weeds will commence growing in it long before it is ready for replacement. This committee is chiefly concerned with methods of preventing weed growth in track so that the full life of the ballast may be realized and the track maintained neatly and economically.

A review of hand weeding on several railroads shows that it costs from $30 to $90 per mile for one weeding and that this work will keep the vegetation down only three to eight weeks, depending largely on climatic conditions. To keep the track clean for the entire season will cost from $90 to $250 per mile for the several weedings required. Hand weeding is not favored because of the high cost and the temporary results obtained.

The old practice of mowing one or two swaths outside of the ballast line with scythes is now being discarded in favor of gasoline-driven track mowers. Reports show that it costs from $4 to $6.50 per mile for each single swath mowed by hand with a scythe while a single sickle track mower will do the same work for $0.70 to $1.80 a mile and a double sickle mower for $0.40 to $0.90.

Along with the introduction of track mowers, most roads have found that the mowing of the right-of-way, outside of the track section, can be done where the contour of the ground permits, much cheaper with horse-drawn farm mowers than with scythes. Figures furnished by several roads show that it costs from $33 to $52 per mile to cut weeds by hand outside of the track section on the ordinary 100-ft. right-of-way, while team-drawn mowers cost only $11 to $36 per mile.

Mechanical Devices

Machines that disc the ballast from the ends of the ties to the toe of the ballast have been used with considerable success on several roads. Discing will temporarily destroy the weeds in that part of the ballast section where they grow heaviest and in that way will reduce the area to be hand weeded to the section between the ends of the ties. The roads using discing machines report that they make a saving of approximately 50 per cent as compared with the use of hand labor for the entire ballast section. As a rule, discers are confined to the lines that have sand, cinder or gravel ballast as it is felt that they mix too much dirt with superior ballasts such as slag or stone.

Reports received by the committee show these costs to vary from $1.50 to $10 per mile for discing on both sides and that machines will cover from two to eight miles per day.

Burning and Steaming

In an effort to reduce the costs of hand methods, locomotive-propelled weed burners and weed steamers were introduced. The locomotive-propelled weed burner is arranged so that a total width of from 15 to 17 ft. will be covered by the flame. Machines of this type operate at a speed of from 8 to 12 miles per hour and cover from 45 to 65 miles per day. They consume from 45 to 90 gal. of crude oil per mile and the cost of operation varies from $3.00 to $6.75 per mile from one burning, depending on the size of the burner and the growth of weeds. If clean track is wanted, it is necessary to have two or three

double burnings a season at a total cost ranging from $12 to $14 per mile.

Weed steamers or scalders were introduced about the same time as weed burners. Steaming is not generally favored as it leaves a ragged looking job, requiring too much hand labor to clean up. The cost ranges from $3.75 to $12.85 a mile for one time over depending on the size of the steamer, the width covered and the speed of operation. As with a flame burner, the roots of the weeds are not killed and two or three trips a season are required to keep the vegetation down, which makes the cost for the season run from $7.50 to $38.50 per mile.

To reduce the cost of burning further by the elimination of work train expenses, several companies have put on the market small gasoline-driven weed burners. Later improved machines with movable pipe burners were brought out that will burn an initial width of 12 to 20 ft. and as much wider as desired on second trips up to 35 ft.

A check on the performance of these machines shows that they will cover from 15 to 25 miles of track per day, burning from 15 to 38 gal. of fuel oil per mile and costing from $2.50 to $4.50 per mile of single burning, depending on the kind of machine used and the weed growth being burned. Owing to their flexibility, ease of handling and economy of operation, it is felt that this type of machine is the best for any territory where burning is considered the desirable method of weed control. As far as fire hazards and the return of weed growth are concerned, they have the same disadvantages as the large locomotive-propelled burners, but the fact that they accomplish the same or better results at a lower cost makes them the preferred machine for burning weeds in the track section.

Chemical Weeding

Two kinds of chemical are being used. One is a poisonous compound, made up of arsenic trioxide containing 4 lb. of chemically pure arsenic and 1 to 1¼ lb. of caustic soda, dissolved in a gallon of water in the concentrated solution. The other is non-poisonous.

Each chemical has its particular advantages. The chief advantages of the poisonous compound are that it is cheaper, it has a certain beneficial effect on the ties, attributed to the wood preserving value of arsenic and some roads feel that the cumulative effect of the arsenic poisoning is greater than the non-poisonous. The non-poisonous compound, however, is not dangerous to live stock and is very effective on certain types of vegetation such as horsetail, Johnson grass, witch grass and quack grass that are not readily killed by the poisonous compound.

The amount of concentrated chemical required for treatment will vary considerably according to the weed growth. On first applications the amount runs about 75 gal. per single track mile. Owing to the retarding effect on future weed growths, second applications take about 50 gal. per mile and this decreases on subsequent treatments to as low as 30 gal. A fair average to assume for third and succeeding treatments is 40 gal. per mile. The application train covers from 50 to 85 miles of track per day and operates at a speed of from 10 to 14 miles per hour. The cost varies considerably, depending on the kind of chemical being used and the weed growth. Figures gathered by the committee show that the cost of applying the non-poisonous chemical runs from $28 a mile for second applications to $41 a mile for first application on heavy growth. The poisonous product is somewhat cheaper and costs from $11 a mile for second and third applications to $23 a mile for first application where vegetation is heavy. The figures shown are for one treatment.

As a rule, one treatment is sufficient for an entire season and the effects of this treatment carry over into the following year, so that less vegetation will be in the track the next season and the costs of controlling it are correspondingly less.

Discussion

Two questions in connection with this paper were discussed at length. A number of members were under the impression that weed burners injure treated ties by cooking out the preservative, and, sometimes, by setting them on fire. Others were under the impression that the steaming process also cooks out the preservative. However, several members who have used the weed burners over a period of years, reported that, if the burners are operated properly, the surface of the ties is not heated to a higher temperature than by the summer sun. It is true that a decayed tie will frequently catch on fire, but sound ties, either treated or untreated will never be damaged by properly operated weed burners. While the ties are sometimes heated somewhat more by the steam equipment, the temperatures are not sufficient to do any damage to the ties.

The question as to whether the railways should buy the chemicals for weed destroying, and apply them with their own equipment, or should rely on the manufacturers to make the applications, was also discussed. Considerable difference of opinion developed, some of the members believing that the manufacturers have a more definite knowledge of the chemicals and the methods of applying than railway employees can acquire, since the latter are called on to use this type of weed destroyer only intermittently. Others indicated their belief that selected railway employees can become as expert in the application of the chemicals after a short period as the representatives of the manufacturers.

Getting the Most From Labor-Saving Equipment

By M. M. Backus

Assistant Chief Engineer Maintenance of Way, Illinois Central System, Chicago

It is estimated that in 1928 the Class I railroads of the United States were carrying an investment in labor-saving equipment of $400,000,000. The interest alone on this investment, at 6 per cent, amounted to $24,000,000, or enough to pay the wages of 27,600 section men working 8 hours per day, 306 days per year. The repairs to these machines during the same year amounted to approximately $26,000,000, or the equivalent of the wages of 29,900 more men working 306 days per year. The depreciation amounted to approximately $20,000,000. In all, there was paid out for labor-saving devices for Class I railroads last year $70,000,000, or enough to pay the wages of more than 80,000 men working 306 days per year, which $70,000,000 had to be earned by these labor-saving devices before any return was made to the railroads. It is evident that some means had to be adopted to keep this equipment at work at least a large enough portion of the time to earn the carrying charges. To get at the problem intelligently it was necessary to know to what extent the machines were used. We had kept records for several years which gave us the output of the machines when in use, and by comparing the results with hand labor, we knew with reasonable accuracy, how much saving accrued when the machines were at work. There was, however, a tendency to overlook the repairs and the interest charges, and these, or at least the latter, were accumulating during the entire 365 days in the year.

The Monthly Equipment Report

Instructions were therefore put into effect that there should be included on the monthly equipment report, not only the individual number of the machine and its condition, but also the number of days that each item of equipment was worked. At the end of the year we worked up a statement listing the different devices, giving their first cost, the depreciation, the cost of repairs (not estimated, but taken from the accounts), overhead expenses, insurance and taxes, and the savings made per day when the machine worked. This gave the number of days a machine had to work before there was any return to the railroad.

In the case of the joint oiler, this would work out about as follows:

First cost, including freight and storehouse expenses ..	$7,600
Interest on investment at 6 per cent	456
Insurance and taxes—1½ per cent	114
Money at 6 per cent set aside annually to replace at end of life (est. 10 yrs.)	577
Annual cost of repairs	436
Overhead—25 per cent of repairs	109
	$1,692

Machine made 23 miles per day
Saving, $3 per mile or $69 per day
Machine has to work at least 25 days to break even

In the last column of this statement we showed the number of days the machine had actually worked. This statement showed at a glance the individual machines on which we were losing money, and also showed where we were getting substantial returns from some machines and should consider making recommendations for additional machines of the same type.

The second annual statement, made up in the same form as the first, indicated that we were securing better results, which were partly due to taking credit for the days actually worked, but—better yet—were due to more intensive planning and follow-up methods.

The programming of work had much to do with this increased efficiency. For many years we have had a program for our ditchers, ballast-unloading devices, steam shovels and pile drivers, which was governed by the appropriation and the amount of work budgeted for the year. We felt that the programming should be extended to all of our labor-saving devices and should be done by the officer of the territory to which machines were assigned. As long as we do not have sufficient machines to cover our entire territory, we are able to keep the days worked approximately to the proper number by transferring them from the man who does not use them to the man who does. This is evading the issue, however, for, generally speaking, if a machine is economical for John, it is economical for Henry, and possibly Henry can be converted to its use.

One need not always confine the work to that implied by the name of the machine. For instance, a rail-handling machine is often adapted to handling other materials, doing clamshell work, to decking bridges, etc.

One can, of course, overdo the variety of use. We had a paint spray on our oiling machine but never found time to use it, for the oiler could save us more money oiling rail joints than it could spraying paint, and we were able to get a spraying outfit for about 10 per cent of the cost of the oiler. Why, then, tie up a $7,600 machine when a $760 machine would do the work.

One of the essentials in securing the maximum use of labor-saving devices is a proper system for keeping machines in repair. This requires a stock of repair material where certain items are used frequently enough to warrant their being carried in stock.

We have had for years a system equipment inspector who works with a mechanical equipment inspector and looks after the inspection and repair of steam-driven equipment, such as steam shovels, ditchers and lidgerwoods. They also handle spreaders and automatic air dump cars. The heavy repairs are made in our mechanical shops. This man also spends considerable time with the younger operators and helps break them in.

Our ownership of gasoline-driven machines has grown so rapidly that it was found necessary several years ago to put on a system supervisor of motor cars, who has general jurisdiction over the repair of gas-driven machines and works with the division motor car men in keeping this equipment in condition for service.

As we endeavor to have a designated officer advised when a machine is lying idle and available for use elsewhere, we also encourage the use of the telegraph and telephone in case assistance is needed in getting a disabled machine back into service. Ordinarily, the divisions are able to keep their assigned machines in condition for use with their repair organizations, but occasionally we get a call in the general office for express shipments, and these are given preferred attention, with close co-operation from our purchasing department.

It is a big advantage to have machines operated by men who are mechanically inclined and interested in their output. We call on the manufacturers for service men where we think they are needed, but we feel that many a machine has its years of service materially decreased because of carelessness or lack of knowledge.

The securing of efficient operators and the keeping of equipment in good condition are big problems that have been only partially solved. We do not, by any means, feel that we have reached perfection, but we know that interest has been aroused by the comparative statements sent out from time to time and feel that we are making progress in securing the more complete utilization of our labor-saving devices. We will be interested in learning of other plans which are being used or can be used to secure results.

Good Workmanship In Relaying Rail

One of the committees was instructed to "develop standards of good workmanship in laying rail and recommend methods of insuring adherence to those standards." The report presented on this subject took the form of a complete outline of recommended practices in carrying out rail renewals in which were included specific instructions designed to insure good workmanship. Paragraphs in the report dealing with this particular feature of rail renewals are reproduced below. The chairman of the committee was C. W. Baldridge, assistant engineer, Atchison, Topeka & Santa Fe, Chicago.

Do not permit the rails to be dropped, but insist that they be lowered to the ground with the crane under control.

It will usually be advisable to unload the rails for curves first so that the blue end rails may be distributed where most needed; then unload the inferior quality rails in the locations where the instructions permit of their use, and finally fill in the remaining tangents with such rails as may be left.

Lay one side of a track only on each day and lay the rails on the opposite side the following day. This will permit the rail laid on the first side to become well settled and the tie plates seated before the second rail is gaged to it.

Place a slow order each evening, limiting speeds to ten miles per hour over the rail laid during that day. This will allow the rails to become seated without heavy thrusts of engine and car wheels, due to speed, and will help in maintaining correct gage.

If a tie scoring machine is not used, experienced men should adze, outside of the tie plates, all ties needing adzing, in advance of the rail laying work. Arrange to have the foreman in charge of this work accompany the gang, with a straight edge which will cover five or six ties, and check the adzing to make sure that good and true bearings are being provided for the new tie plates.

Two or three men, using vertical-handle rams or tampers, can drive down the plugs as rapidly as the gang will progress, but it is always necessary to watch these men to insure that the plugs are driven to the bottom of the spike holes, for many workmen are prone to strike a slanting blow, half driving the plug and breaking it off at the same time.

Much of the inequality of the gage of track following newly laid rails is due to uneven tie plate beds, some of them tipping the rail in and others tipping it out. Careful adzing and accurate spiking are the two essentials of correct gage of track.

Adzes should be kept sharp and adzers should cut off the projecting tops of tie plugs and not break them off, as a broken tie plug leaves a ragged piece of wood which will hold moisture and invite decay.

Following the adzers, a man with a stiff broom should sweep the tie plate bed as clean as is practicable and a swabber, equipped with a suitable swab or brush and a bucket of hot creosote, should immediately give the entire adzed portion of the tie, including the old tie plate bed, a thorough coating of creosote.

Next have the new tie plates set in place. Use enough men on this work and insist that every plate be placed correctly, with no chips, particles of ballast, or other matter left under any part of the plate to tip or cant it out of a true plane, for any such obstruction under the plate will tip the rail while it is being spiked and thereby cause erratic gage when the rail has settled under traffic.

Care must be taken to keep the rail and joint bars free from sand and dirt, as otherwise they will not bolt up to a good fit. Grit which may be sticking to the rail or joint bars is likely seriously to affect the slip of the rails through the joints, which is so necessary to take care of the expansion and contraction of the steel.

To provide for the expansion of the rails, use shims of the thickness authorized in the expansion table given in the book of rules, for the temperature which exists at the time the rails are being laid. Shims should be left in place until 12 or 15 rails have been laid in advance, and should then be removed. If shims provided for one temperature are left in place until the rails have reached a higher range of temperature, the expansion of the rails will force them ahead, if possible, but when the string of rails already laid makes it impossible for the rails to push ahead, they will kink at the joints and buckle or bend sufficiently to take up the expansion.

The joint bolters should follow behind the steel crane, and they should place and tighten all bolts in each joint. The joint bolts should be gone over again and retightened a week or so after they are first installed.

Following the bolters, a workman with proper tools should adjust the tie plates, where required, to the end that at no point will the base of the rail be riding the shoulder of the tie plate.

The gage spikers should be among the most competent men of the gang in driving spikes straight and true. On tangents, when spiking the first new rail laid, it should be spiked to gage from the old rail on only two or three ties and they should be at points near the quarters. No gage spikes should be driven opposite a joint or any kinked spot of the old rail. The first line of rails should be gage spiked only often enough to keep a good workable width of track, then spiked as straight as possible.

In gage spiking, the track gage should be placed so that it makes contact with the face (the top of the head) of the rail at all three points of the gage. The rail must then be thrown to contact with the downward projecting lug of the gage, *by the use of a lining bar,* and held there until the outside spike is driven. Under no circumstances should the rail be driven up against the gage by blows of a spike maul, the end of a lining bar, or any other tool. A great many rail failures, and particularly split web failures, are due directly to blows from a spike maul or other tool.

The inside spike must be so driven that it will hold the rail against the outside spike and to correct gage.

Rail anchors should be applied as closely behind the spikers as is practicable. In placing these anchors, each pair must bear against the same side of the same tie. Also do not adhere to any fixed location for the anchors, except opposite slot spiked joints, but select sound ties on which the tie plates do not reach or overhaul the edge of the ties against which the anchors must bear. Keep in mind, however, that anchors should not be placed against *adjacent* ties except opposite slot spiked joints.

Discussion

The report was received with but little comment. Some objection was raised to the requirement that a slow order be maintained on track for the first night after new rail had been laid, on the ground that it would be difficult to justify it in the face of objections from the operating department, but a test vote supported the committee's position.

A New Day In Maintenance

By R. H. Ford

Assistant Chief Engineer, Chicago, Rock Island & Pacific, Chicago

Railway maintenance consists fundamentally of three closely related but nevertheless distinct functions, namely, keeping the roadway in its present state, and usually referred to as ordinary maintenance; replacing wornout parts by better parts; and substituting parts which, while still serviceable, have become obsolete or inadequate before they are worn out in service, usually because of advances in the science of transportation. An intelligent understanding of these differences and their relation to the property, has become increasingly important in recent years and will continue to be even more important within the next 10 years because of the trend of the times in modern industry.

The railway industry of 1929 has little resemblance to what it was in 1890. It has in fact already greatly changed since the period of federal control. An analysis of the reasons for this will, I think, show conclusively that while we railway men can pride ourselves on what has been accomplished in recent years, the fact remains that the underlying cause has been the influence of the even greater advances that have occurred in the other major industries. As will always happen when you get a better understanding of the views and problems of others, we of the railroads have obtained in recent years a much better and more diversified knowledge of the requirements of industry, which in turn has enabled us to apply the results to the making of a better success of our own business.

I have referred to one of the principal functions of maintenance as the substitution of parts which have become obsolete or inadequate before they have become worn out in service. Practical application of this feature has served at times as a sort of two-edge sword, either in permitting extravagance through the substitution of facilities not presently justified or in serving at times to justify the undue retention of obsolete or inadequate parts where service life had not yet expired, under the guise of economy.

While it is doubtless true that many conditions of the past have contributed to make such things possible, I am persuaded that the results of our rapidly advancing conditions in industrial relations, will operate more readily in future to make undesirable retentions and unsound expenditures more readily ascertainable than they have been heretofore. We railroad men must have well in mind that other important forms of national transportation are now competing with the railways for traffic, namely, the highways, the waterways, and the airways, and what is more to the point, they have been one of the principal factors in compelling the railroads to speed up traffic if they are to continue to hold their place as the principal transportation agency. It is through this action that a field hitherto unexplored is about to open up for railway engineering and maintenance.

Modern Tendencies in Locomotive Design

I refer to modern tendencies of locomotive design and the influence which it does and will continue to exert on axle loading, and in turn to the powerful and reactive influence that this must have on maintenance of way and structures. Under the practice which has prevailed for many years in rail transportation, the requirements upon locomotive design has been for constantly heavier locomotives, with increasingly greater concentrated axle loads, low driving wheels and relatively slow speed requirements, on the theory that the cheapest and most economical transportation was obtained by increasing the number of heavily loaded cars behind the tender.

But under the influence of dependable and safe movement has come the insistent demand for greater speed, less road time and less terminal time, meanwhile coupled with the absolute necessity imposed upon railway managers for reductions in operating costs, irrespective of the mounting charges for labor and material. Meanwhile there have been demands—I could almost say commands—from the traffic departments that greater effort is necessary if they are to hold the business against the inroads of the subsidized waterways and highways.

Slowly perhaps, but all the more surely, all of these factors have served to accelerate advances in locomotive design which will, I believe, exert a profound influence in the future of railway maintenance. There are unmistakable evidences that radical changes are already on the horizon and that locomotives procured for replacements will not be designed or rebuilt along existing lines or from existing plans. There is a tendency to obtain increases of locomotive effort by more nearly equalizing the driving wheels of both freight and passenger locomotives through increasing the size of the freight engine driving wheels.

Investigations show that since 1888 the tractive power and weight of our locomotives increased rapidly from year to year, but in the last few years there has been a decided recession. The indications are now that we will not advance much above present weights. Rather, it seems that the conditions under which efficient power will be developed are those which will provide greater hauling power with even lower driving axle loads than are even at present anticipated. I think I am safe in saying that we have about reached the peak of axle loading in so far as motive power is concerned.

Wheel Loads Will Not Increase

While there is a marked tendency for increased capacity for locomotive tenders, the extra weight is being distributed over 12 instead of 8 wheels, and this points to the same development for hopper or gondola cars, so that even with greater capacity, their axle loads will not be any greater, and in fact may be less, than on the eight-wheel cars. For other types of equipment, such as box cars or passenger equipment, the maximum loading conditions have now about reached their economical limit. In other words, while the speed will increase, this will not be met by increases in axle loading or an increase of impact on the track structure. Rather, the tendency will be for a decrease through the securing of better counterbalancing and distribution of weight.

Stabilization of concentrated loads on the track structure, and a clearing up of the effects of impact, will be possible sooner or later as the result of the research work of the Committee on Stresses in Track of the American Railway Engineering Association, under the able leadership of Professor A. N. Talbot of the University of Illinois. Its advent will open up unheralded opportunity for maintenance of way officers. With the possible exception of the yet uncharted fields of traffic, I am convinced that no place in railroading offers such opportunities for its advancement and reformation in maintenance of way practices through the medium of decreased use of labor and materials and changes in our present transitory methods of their use, as well as through the development of new uses for machinery and mechanical appliances in construction and maintenance.

The problem that will soon confront the maintenance of way officer is to be prepared to take advantage of the reduction in maintenance of way expenditures, made possible by the stabilization of locomotives and cars, a thing which in the history of railroading has never before been within the reach of possibility.

I have referred to the release of items of property before they have served their service life, largely because of obsolescence and inadequacy. The principal contributing cause of this has been advances in equipment weights and locomotive design. No sooner have track structures been built than it

has been necessary to alter, strengthen, replace or renew rails and fastenings, ballast, bridges, ties and other fixtures to meet the increasingly heavy axle loadings long before their service life had expired. This of itself has contributed powerfully to the practice of the American railways to temporize with facilities and build only for the present. It has affected the use of labor and materials to a greater degree than the average person realizes.

Stabilization and uniformity of requirements upon structures will, I am convinced, ultimately effect a complete change in policy and practices in this respect, permitting a greater degree of permanency, and with it the use of better and more scientifically designed appliances, requiring better materials, less labor and a simpler and more concentrated supervision, and a different character of supervisory forces. It will also, in turn, tend to effect a greater reduction in charges for depreciation and retirement.

Stabilization of locomotive and equipment loadings will enable better uniformity and increased standardization in the track structure. It will permit a more precise knowledge of the character of ballast requirements and develop ways for its conservation. It should eliminate the necessity of vast expenditures for subsurface improvements and drainage caused by deformations of the roadbed, much of which can be traced to unequal pressure on the subsoil through unequal and excessive superimposed loads, to which I have referred.

There should be splendid opportunities for better and more skillful supervision through a combination of supervisory groups, as for example, track, water service, bridge, building, signal, telegraph, claim and other subdepartments. Readjustments in local distribution and supply, with combinations not now possible between mechanical and roadway maintenance, also offer attractive possibilities in this connection.

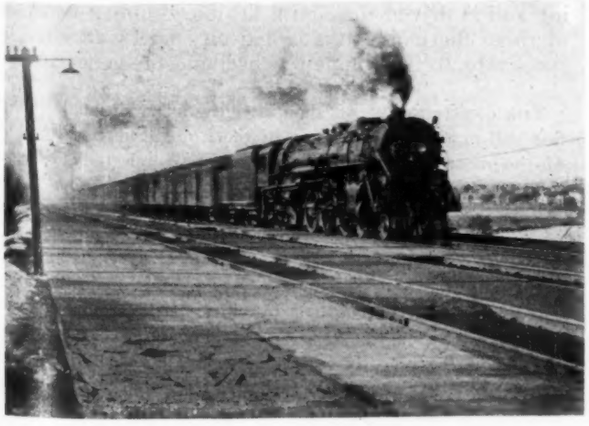
Standarization to a point not now possible, through simplicity of design and interchangeablity of parts on a scale not yet even attempted and embracing all forms of railway maintenance, will soon be practicable. Few persons who have not intensively examined the subject, realize the great possibilities in this direction.

The following figures will give an index of the opportunities in this direction:

Approximately 25 per cent of the employees of our railroads are in the maintenance of way department. Of these, 83 per cent are employed on the track, largely in common or semi-skilled labor. Our expenditure for the upkeep of the track is approximately 78 per cent of the total outlay for maintenance of way and structures. Of the total expenditures for labor and material, approximately 53 per cent is for labor and 47 per cent for material. The maintenance of way and structures expenditures account for a little less than 14 per cent of the total operating expenses on the Class 1 railroads in the United States, while maintenance of equipment consumes 19¾ per cent, with 34¼ per cent for transportation. The influence of a more permanent way, rendered possible as aforesaid, will also permit reductions in transportation and mechanical expense, and especially the latter.

We cannot even hazard a guess at what the future holds out in this direction but it is safe to say that there are possibilities and in proportion to the possibilities, there are opportunities both individually and collectively. Not only are they possibilities for the railway maintenance of way men of today but they stretch out infinitely greater for his successor of tomorrow.

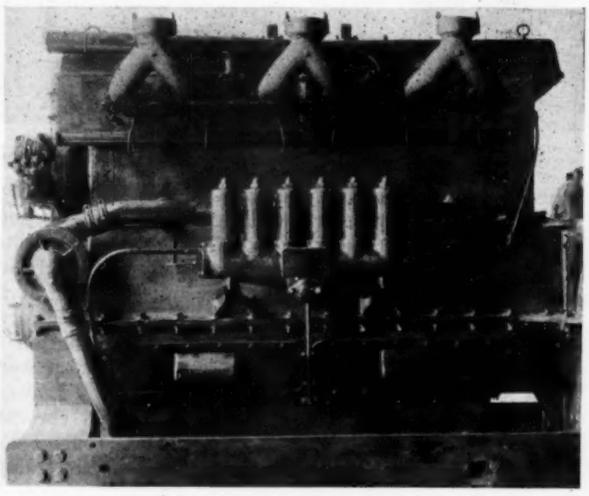
* * *



On the Boston & Albany

Hall-Scott 350-Hp. Gasoline Engines

THE 350-hp. Hall-Scott engines used in recent Brill gas-electric rail cars are designed for exceptional efficiency and incorporate numerous special features developed as a result of the extensive engine-building experience of the Hall-Scott Motor Car Company, Berkeley, Cal., division of the American Car & Foundry Motors Company. The preliminary dynamometer tests showed a fuel consumption of .55 lb. per brake hp.-hr. through the practical operating range, and actual service tests are said to have shown a car performance of 160 to 195 ton-miles per gal. with a low grade fuel. This high economy is achieved with

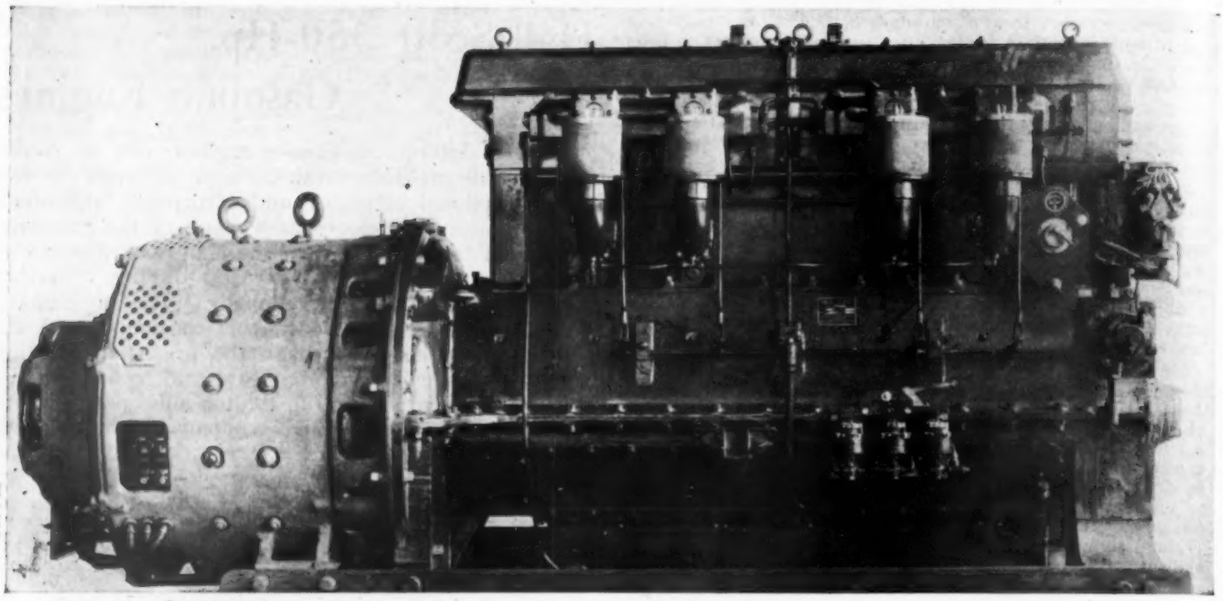


The Exhaust Manifold Side of the Hall-Scott 350-Hp. Gas Engine

a relatively low compression ratio, the gage pressure being 72 lb. The over-all efficiency is due partly to an unusually high mechanical efficiency which is achieved by holding down the friction losses in the accessory drive mechanism by the use of ball bearings, the complete counterbalancing of the crankshaft, which is also equipped with a torsional vibration damper, and the holding down of the inertia forces in reciprocating parts by the use of light-weight alloy pistons, and chrome-nickel steel connecting rods. The thermal efficiency also is high, the temperatures of both the water jacket and the intake manifolds being under the direct control of the engineman and the engine being operated with high cylinder head temperature of the incoming gas.

Design Notable for Power and Light Weight

The Hall-Scott engine is designed to supply ample power when used in dual installation to propel heavy cars at high speeds. Cases are on record in which moderately fast schedules have been maintained by a single engine while the other engine was undergoing repairs. The compactness of the power plant with the new engine permits the use of a smaller engine room, thus leaving a larger percentage of the total car space available for pay load purposes. The light weight of the dual engine installation is designed to make possible the use of equipment developing 700 hp. without exceeding the rated capacity of standard M.C.B. four-



Hall-Scott 350-Hp. Engine Directly Connected to a Heavy-Duty Direct-Current Generator

wheel trucks. The six cylinders in each engine are fed through four carburetors, manifolding being designed in such a manner that a uniform gas flow is maintained to all cylinders, while volumetric efficiency at operating speeds is promoted by the use of long branch manifolds, built in line with the intake passages in the head so that the ramming effect of the moving column of gas keeps on filling the cylinder after the piston is beyond bottom dead center.

The general design of this engine follows the customary Hall-Scott practice with overhead valves and camshaft and machined dome-type combustion chambers. The six cylinders with 7½ in. bore and 9 in. stroke have a piston displacement of 2,385.6 cu. in. The engine is governed at 1,100 r.p.m., at which speed it develops in excess of the rated 350 hp. At the governed speed the piston speed is 1,650 ft. per min. Two inlet and two exhaust valves are used in each cylinder to lower the weight and facilitate cooling of the valves.

Multiple ignition is supplied from two high-tension magnetos driven from the same shaft through a helical gear by the main accessory drive shaft. The cylinder head is cast in two interchangeable sections. Each section has its own camshaft and these are joined at the center of the engine by means of a Morse-type coupling. The cylinder-head castings are made from a special chrome-nickel cast-iron mixture poured from an electric furnace at a much higher temperature than ordinary cast iron. This gives an extremely fine-grained mixture, readily machineable, about 30 per cent harder than cast iron, and having the peculiar characteristic of being able to resist the pounding of valves at temperatures which would cause them to bed into cast iron or semi-steel. The same mixture is used for the cylinders, which are made up as separate liners inserted in the main block casting.

In order to achieve light weight without sacrificing strength, it has been necessary to use considerable quantities of light-weight metal. Both crank cases, the bell housing, the intake manifolds, the rocker-arm cover and several other minor parts are made of aluminum alloy. High-tensile steel alloys have been used in the crankshaft, main accessory drive shaft, connecting rods and camshaft to lighten the weight without sacrificing the necessary factor of safety. The general principle of using heat-treated alloy steels for all parts subject to stress or to stress and wear, and using case-hardened steel for all parts subject only to wear, has been very closely followed in this engine. All gears are of high nickel-alloy steel heat-treated, case-hardened and ground, the teeth being in all cases of either the helical or spiral bevel type for silence, strength and long wear. The parts are further protected from wear by a lubrication system which is under close thermal control, the oil supply coming from a water jacketed sump through which the water is drawn from the radiator before being pumped to the cylinder block and head. Besides being maintained at a relatively constant temperature, the oil is filtered through a battery of Hall-Winslow filters before passing to the bearings, and a large amount of oil is pumped over the heated cylinder heads where any motor fuel passing down into the oil through the piston rings is distilled off. It is claimed that in operating these engines on gasoline fuel, the viscosity of the lubricating oil is held practically constant on account of this distillation feature.

Five breathers are provided on the engine to give thorough circulation of air and allow the vaporized gasoline to escape from the engine head and crankcases. The generator frame is bolted directly to the bell housing and is driven through a flexible coupling consisting of three thermoid discs bolted on spiders attached, respectively, to the engine flywheel and the generator.

THE CONSTRUCTION of about twenty-five additional miles of line will mark the completion of the Potosi-Sucre railroad, one of the most important in Bolivia. Although only 150 miles long, the line has taken thirteen years to build and is one of the costliest in the republic because of the extreme ruggedness of the country it traverses. Politically, the new road is important because it gives Sucre, the capital of Bolivia, its first rail connection with the outside world. Economically it is of equal importance, because it provides marketing facilities for the unexploited agricultural area around Sucre. A feature of the line is the recently completed bridge across the Pilcomayo river. With its six spans, each 100 feet long, resting on concrete piers, this is the longest bridge in Bolivia.

New Books

Books and Articles of Special Interest to Railroaders

(Compiled by Elizabeth Cullen, Reference Librarian, Bureau of Railway Economics, Washington, D. C.)

Books and Pamphlets

Deep Water Navigation Between Lake Erie and Tidewater, by L. F. Loree. "If now I may venture upon a suggestion, my recommendation would be that the President be requested to do here in the Northeastern States what he is doing in Nicaragua; that is, detail Army engineers to make a complete study and report on the Great Lakes to the Hudson River, all down hill, deep water navigation, which I am urging as the only project that will invite, justify and retain public interest. We shall then be in possession of facts upon which we may base a reasoned conclusion." p. 15. Address before Atlantic Deeper Waterways Association Convention. 15 p. Pub. by The Delaware & Hudson Co., New York City. *Apply.*

One Hundred and Three Years of Railroading—The New York Central Lines 1826-1929, by Charles Frederick Carter. A beautifully illustrated historical sketch. 16 p. Map. Pub. by New York Central Lines, New York City. *Apply.*

The Railroad Situation and Outlook. An autumn survey of the railroad field. 4 p. Pub. by Evans, Stillman & Co., New York City. *Apply.*

Significance of the Rocky Mountains to Transcontinental Railways, by Ralph Budd. A contribution to history and to economic geography as well. "The challenge which the great rock wall of the 'Shining Mountains' presented as an obstacle in the expansion of our national boundary has been completely answered by the various transcontinental railways. . . . The employees who operate across these mountains, too, are entitled to more than ordinary appreciation for the safety as well as the smoothness with which they conduct the transportation." p. 11, 12. 12 p. Pub. by Great Northern Railway Co., St. Paul, Minn. *Apply.*

Periodical Articles

Mantell Emerges. Further complications regarding the Chinese Eastern brought out in an interview with J. J. Mantell, now Railway Adviser to the Chinese Nationalist government. Time, September 16, 1929, p. 32.

Reduction of Weight in Rolling Stock, by G. H. Taylor. Advantages of lighter rolling stock and modifications of equipment construction necessary to obtain the reduction in weight. "Articulated stock," p. 538-545. "Aluminum and aluminum alloys," p. 545-559. Illustrated. Journal of the Institution of Locomotive Engineers, June-August, 1929, p. 533-560.

The World Agricultural Census in the Latin American Republics, by Leon N. Estabrook. After a study of existing statistics which brought out the defects and lack of comparability of them, a program has been worked out for a standard form of census questionnaire for Latin America for the agricultural census of 1930. This article describes both difficulties and accomplishments in getting the program under way. Bulletin of the Pan American Union, September 1929, p. 882-896.

The Ups and Downs of Waterways, by S. A. Thompson. "By 'The Ups and Downs of Waterways' is meant . . . the variation in the amount of popular favor shown, and legislative support given, to our waterways." Waterway history is traced from colonial times to the present and the article is illustrated by pictures of vessels prominent at one time or another, bateaux, flatboats, keel boats, canoes, etc. "The Clermont" is shown on page 14 while on page 15 are "The 'New Orleans,'" the first steamboat on the western waters" built at Pittsburgh in 1811 (no one at present will recognize the Pittsburgh shown in the background) and "The 'Walk in the Water', first steam vessel on the Great Lakes." National Waterways, September 1929, p. 9-18, 61.

Looking Backward

Fifty Years Ago

The Reading & Lehigh [now part of the Reading] was sold under foreclosure at Philadelphia on September 23 and bought for the bondholders for $200,000. The road extends from Reading, Pa., to Slatington, 42 miles, and was constructed in 1874 to give the Wilmington & Northern (also now part of the Reading) a connection with the Lehigh Valley at Slatington.—*Railroad Gazette,* September 26, 1879.

At a meeting of general passenger agents of 30 railroads at New York on September 11, action was taken to abolish all commissions on competitive passenger business. It was also decided that any railway officer violating this agreement by authorizing the sale of tickets at reduced rates or by paying ticket sellers, solicitors or speculators commissions, drawbacks or rates would be dismissed from railroad service.—*Railway Age,* September 25, 1879.

Twenty-Five Years Ago

The railroad commission of Georgia, the railroads operating in that state and the federal government are now all involved in a vital contention as to the power of a state to prescribe intrastate rates that directly affect interstate rates, which the federal government alone controls. The Georgia commission ordered the railways to make reductions of rates within the state, averaging 44 per cent on 61 commodities. The railways declined to comply and on September 24 they were sustained in their refusal by an injunction from the United States Circuit Court.—*Railway Age,* September 30, 1904.

A test conducted on a 10-mile stretch of track on the Mahoning division of the Erie under the direction of representatives of that road, the Baltimore & Ohio, the Pennsylvania and the Pittsburgh & Lake Erie, to determine relative resistances of cars equipped with different types of center plates and side bearings showed that a 30-car train equipped with ball-bearing center plates and side bearings had a train resistance of 12.14 lb. per ton while a 25-car train equipped with flat center plates and side bearings had a resistance of 13.64 lb. per ton. With corrections for the difference in tonnage, the ball-bearing trains effected a saving of 5,776 lb. of water per 10 miles, which is an equivalent of 828 lb. of coal.—*Railway Age,* September 30, 1904.

Ten Years Ago

Glenn E. Plumb, author of the Plumb plan for turning the railroads over to the railroad employees at government expense, Warren S. Stone, and other labor leaders, appeared before the Senate committee on interstate commerce on September 23 and 24 to protest against the Cummins bill. They objected particularly to that part of it which makes it a misdemeanor for railroad employees to strike pending the settlement of their disputes with railroad managements by arbitration.—*Railway Age,* September 26, 1919.

Raising a train shed having an area of approximately five acres and weighing about 18,000,000 lb., from 4 to 17 in. above the level to which many of its supporting columns had sunk, is the unusual engineering project just completed by the Delaware Lackawanna & Western at its Hoboken (N. J.) terminal. The work was started in June and completed in August, and was done under the necessity of interfering as little as possible with the 1,500,000 passengers who use the terminal each month and the 225 trains which arrive and depart each day.—*Railway Age,* September 26, 1919.

Odds and Ends of Railroading

To J. L. Eysmans, vice-president in charge of traffic for the Pennsylvania, goes the honor of having been the first railway executive officer to make a transcontinental business trip by airplane.

Another Lady President

The most recent addition to the list of women who are railway presidents is Mrs. T. W. Bickett, who has been appointed president of the state-owned North Carolina Railroad Company, by the governor. The line is leased to the Southern. Mrs. Bickett, besides the title, will receive $100 a month in her new job.

Doubling in Brass

Clyde Rice, justice of peace at Tinley Park, Ill., recently came into prominence when motorists complained that they were being arrested for inconsequential errors and fined excessively, while driving through Tinley Park. When not dispensing justice, Judge Rice is a section foreman on the Chicago, Rock Island & Pacific.

Old Pass Allowed Holder to Ride "Ladies' Car"

A pass on the Logansport, Crawfordsville & South Western, now part of the Pennsylvania, dated 1873, which was the property of the late David H. Strouse, father of Frank E. Strouse, special representative of the general manager, was found by Mr. Strouse among his father's papers recently. The pass, which is quite artistic in appearance, has an amusing specification on its reverse side which reads: "Conductors will permit holder of this pass to travel in ladies' car." David Strouse was district tax and claim agent for the P. R. R. at Terre Haute at his retirement.

Father and Son Crews

NORWOOD, N. Y.

TO THE EDITOR:

Regarding instances where a father was engineer and his son fireman on the same train, when I was last working on the Vermont division of the Rutland, "Black Tom" Mangan was engineer, while his son, whose name I cannot call to mind at present, was his regular fireman on Nos. 120-131, the through freight between Rutland and Bellows Falls. Besides this son, there are also three sons, A. J., Young Tom, and Bernie, who are also running, and another who is braking on this same road.

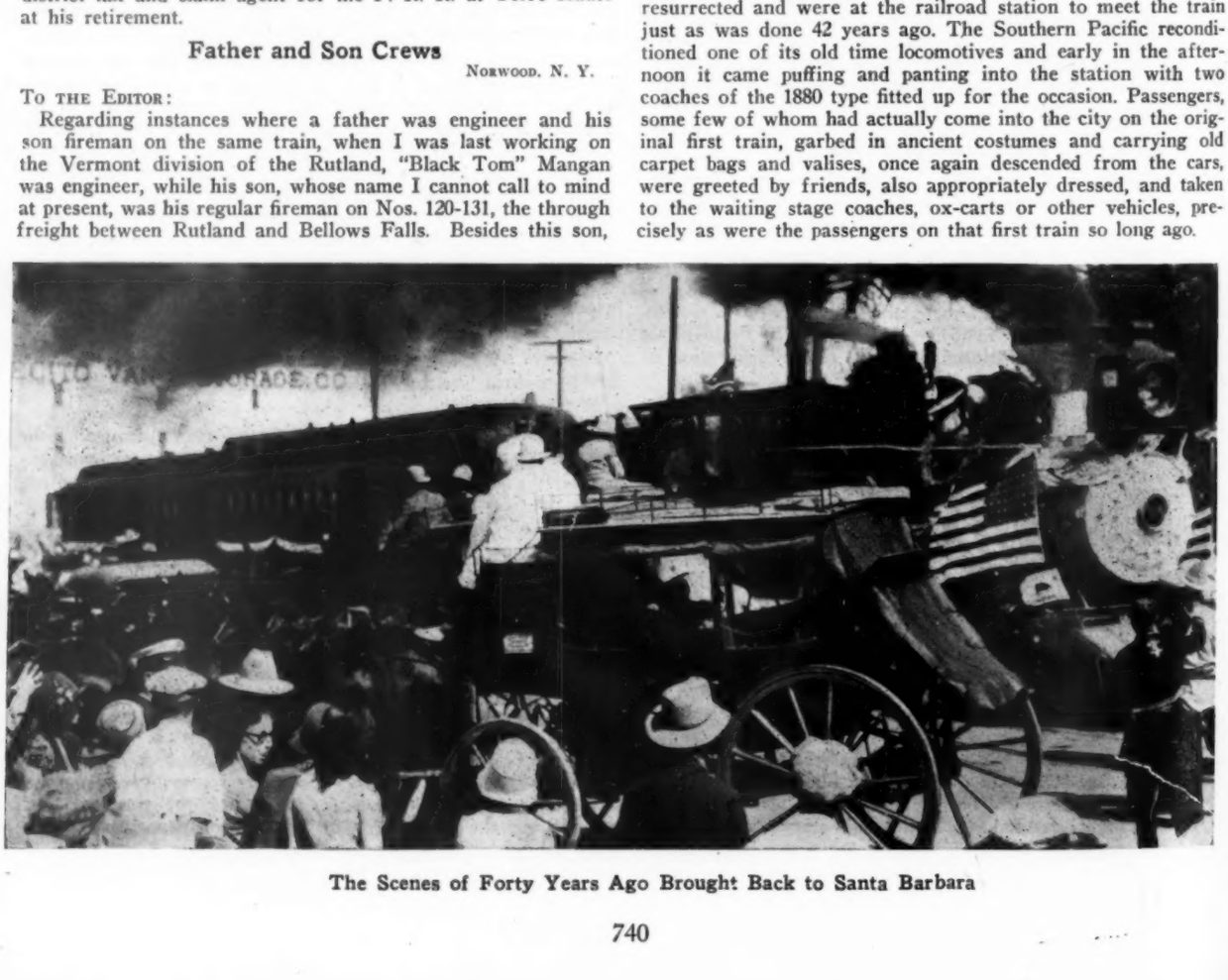
Also, on the same division are five conductors and three brakemen by the name of Keefe, all related. Two of the conductors, cousins, are P. J. Keefe. Ambiguity is avoided by calling the elder P. J. the first, and the younger P. J. the second. There is also a P. J., another cousin, who is an engineer. Four years ago we had a full crew, with the exception of the fireman, by the name of Keefe. This was a rounder job, handling automobile bodies, between Bellows Falls and Rutland.

In connection with railroad lingo, did you ever hear a through freight called a "liner"; a slow branch local a "crawler?"

ROBERT A. SANDERS.

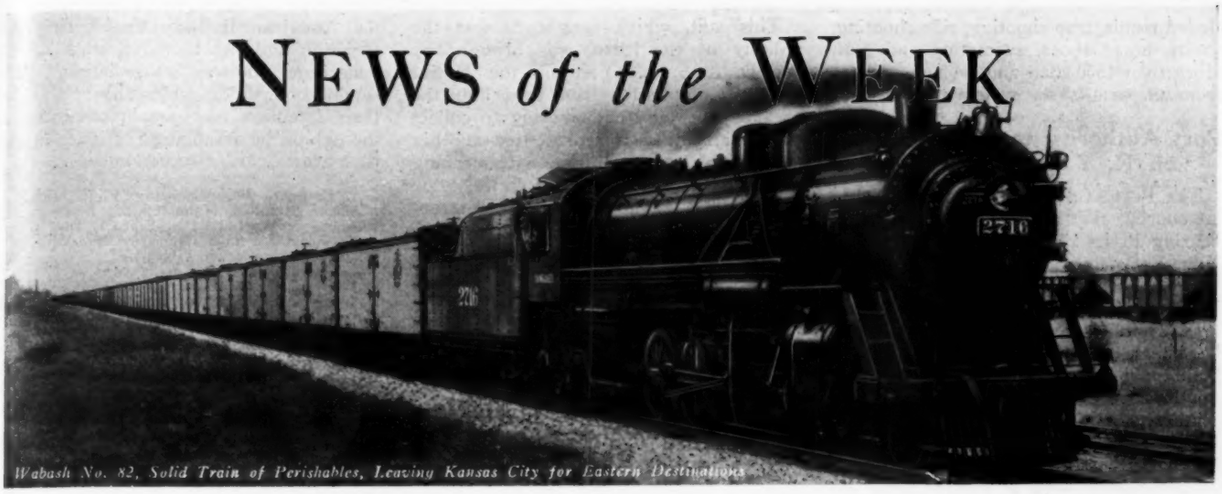
Old Spanish Days

Harking back to the days of diamond-stacked, wood-burning locomotives and little rattan-seated, oil-lighted and stove-heated coaches, Santa Barbara, Cal., recently re-enacted, as a feature of its annual "Old Spanish Days" fiesta, the events accompanying the arrival of the first Southern Pacific train into the city on August 10, 1887. Filled with the spirit of the occasion, the people of Santa Barbara arrayed themselves in costumes of bygone days. The gambler, with his big Stetson hat, flowing tie and Prince Albert coat, strutted as of old. Dainty senoritas in mantilla, tight-bodiced and flowing skirt of brilliant hue, again flirted demurely, while sober-eyed duennas looked complacently on from behind their fans. Cowboys in full regalia, Indians in their war paint, priests in somber robes—all were resurrected and were at the railroad station to meet the train just as was done 42 years ago. The Southern Pacific reconditioned one of its old time locomotives and early in the afternoon it came puffing and panting into the station with two coaches of the 1880 type fitted up for the occasion. Passengers, some few of whom had actually come into the city on the original first train, garbed in ancient costumes and carrying old carpet bags and valises, once again descended from the cars, were greeted by friends, also appropriately dressed, and taken to the waiting stage coaches, ox-carts or other vehicles, precisely as were the passengers on that first train so long ago.



The Scenes of Forty Years Ago Brought Back to Santa Barbara

NEWS *of the* WEEK



Wabash No. 82, Solid Train of Perishables, Leaving Kansas City for Eastern Destinations

THE AMERICAN RAILWAY DEVELOPMENT ASSOCIATION will hold its winter meeting at the Sherman Hotel, Chicago, on December 5 and 6.

THE AMERICAN SOCIETY OF CIVIL ENGINEERS will hold its next meeting at Statler Hotel, Boston, Mass., on October 9, 10 and 11.

THE SOUTHERN RAILWAY has moved its general offices in Washington, D. C., from the building at Thirteenth street and Pennsylvania avenue to a new building which it has erected at Fifteenth and K streets.

THE CAR FOREMEN'S ASSOCIATION OF ST. LOUIS will hold its next meeting on Tuesday evening, October 1, at the American Hotel Annex, St. Louis; paper by W. E. Bergen (M.-K.-T.) on airbrakes.

THE CANADIAN RAILWAY CLUB will hold its next meeting on Monday evening, October 14, at the Windsor Hotel, Montreal. Colonel J. S. Dennis of the Canadian Pacific will present a paper on immigration.

THE NEW ENGLAND RAILROAD CLUB will hold its next meeting at the Copley- Plaza Hotel, Boston, on Tuesday evening, October 8. Professor Kent T. Healy, of Yale University, will give "An American View of English Transportation."

THE NEW PASSENGER STATION of the Reading at North Broad Street, Philadelphia, is to be opened for business on Monday, September 30. This will be the first express stop north of Reading Terminal, taking the place of Columbia Avenue for that purpose.

WILLIAM C. CUSHING, engineer of standards of the Pennsylvania, has been elected to honorary membership in the American Railway Eingineering Association, in recognition of outstanding contributions to the science of railway engineering; for invaluable services rendered the Association as a committee member, committee chairman, director, vice-president and past-president; and for acknowledged pre-eminence in railway engineering and management. The honor has previously been conferred upon only five other men.

A DEMAND FOR A TWELVE AND A HALF PER CENT INCREASE in the wages of all clerical employees and a minimum wage of five dollars per day for freight handlers and station employees has been made by 100,000 members of the Brotherhood of Railway and Steamship Clerks on 25 eastern railways. George M. Harrison grand president of the organization, who made the statement at Cincinnati, Ohio, on September 19, also declared that the brotherhood has, on eastern roads a membership composed of 65,000 clerks and 35,000 freight handlers and station employees.

Report on C. I. & L. Train Control

Division 6 of the Interstate Commerce Commission has issued a report approving the installation of the Miller automatic train stop device, intermittent induction type, manufactured by the General Railway Signal Company, on the Northern division of the Chicago, Indianapolis & Louisville, between South Hammond and Indianapolis, Ind., 160 miles, single track. This system was put in to take the place of the Sprague system, previously installed.

The Railway Business Association to Meet at Chicago

The preliminary program has been issued for the annual meeting of the Railway Business Association to be held at the Hotel Stevens, Chicago, on November 21. The program calls for a forenoon business session at which reports of officers and standing committees will be heard. This will be followed by convention committee meetings, while in the afternoon the second business session will consider reports of the convention committees. The 21st annual dinner of the association will be held during the evening.

Pennsylvania M. B. Association

The Mutual Beneficial Association of the Pennsylvania Railroad employees, held its sixteenth annual general assembly at the Bellevue-Stratford Hotel, Philadelphia, on Monday, Tuesday and Wednesday of this week, with President M. F. Loughner in the chair. The membership of the association. scattered all over the system, in 82 local assemblies, is represented at the annual meeting by 101 delegates. The delegates were addressed by President W. W. Atterbury, and other officers of the road. This association, begun in 1914 with $150 in its treasury, now has assets of over $1,250,000. It maintains an insurance department and publishes The Mutual Magazine.

New Chief of Army Engineers

Brig. Gen. Lytle Brown has been appointed chief of the Army Engineer Corps, to succeed Maj. Gen. Edgar Jadwin, retired. In announcing the appointment on September 17 President Hoover disclosed that a plan is under consideration for a reorganization and decentralization of the public works phases of the Engineer Corps and that it is proposed to appoint three army engineers, one to have charge, under the chief of engineers, of the flywood-control work and other works on the lower Mississippi, one to have responsibility for the improvement of the upper Mississippi, Missouri, Ohio and Illinois rivers and other tributaries to the inland waterway system, and another for the proposed improvements on the Great Lakes and any development which may be undertaken on the St. Lawrence river.

Pennsylvania Annual Athletic Meet

The ninth annual outdoor athletic meet of the Pennsylvania was held on September 21 at Altoona, Pa. The winner was the Central region, with a total of 261½ points. Representatives of the Eastern region took second place, with a total of 215 points. The other competing teams finished in the following order: Western region, 77½, New York zone, 55, Philadelphia general office, 53, and Altoona works, 41.

There was a crowd of more than 20,000 spectators, composed chiefly of employees and members of their families. In the track and field events eight new system records were established.

In the baseball game which closed the day's athletic program, the Altoona Works defeated the Columbus Division by a score of 15-4.

The events contested at Altoona in-

cluded tennis, trap shooting, rifle shooting, quoits, horse shoes, swimming and golf. More than 1500 men and women athletes from all parts of the system competed.

Port Authority to Hold Hearing on N. Y. Inland Station

The Port of New York Authority has announced that it will hold a public hearing in its offices at 75 West street, New York, at 2:30 p. m. October 1, for the purpose of taking evidence to aid in determining the location of the inland freight station which is soon to be built by the Port Authority. The building now contemplated is the first of three to be constructed by the Port Authority for the handling of all l. c. l. freight originating or terminating in Manhattan south of Fifty-ninth street, in accordance with a general plan approved by the railroads as announced in the *Railway Age* of September 14.

The tentative site which will be chiefly considered at the hearing is the block bounded by Sixteenth street and Eighth avenue and Fifteenth street and Ninth avenue. The freight station would be placed in the basement and ground floor of a building to be constructed on that location, and would be served by motorized equipment operating between it and the various railroads.

Court Rules Moffat Tunnel Lease Valid

The present lease covering the use of the Moffat tunnel by the Denver & Salt Lake, under the terms of which the railroad pays an annual rental to the tunnel commission of $345,900, was held to be valid and binding by Judge J. Foster Symes in the United States District Court at Denver, Colo., on September 20. Judge Symes upheld every provision of the lease with the exception of the one which limits the power of the commission to contract with parties other than the Denver & Salt Lake for use of the tunnel.

"The validity of the determinations made by the commission as to the value of the uses and the rent to be paid did not depend upon, and need not await the ascertainment of the final cost of constructing the tunnel," Judge Symes declared. "To admit that the commission had the power to determine these conditions precedent and enter into a binding contract in advance of the completion of the tunnel and then argue that the contract is invalid, because it now appears that the cost exceeds the estimate of the commission made at the time, is illogical and unsound. The legislature never intended that the validity of any lease should depend upon the commission guessing the exact cost of the tunnel."

Judge Symes criticized the commission, stating that George Lewis, general manager, and James Cohig, resident engineer, lacked the experience and qualifications necessary to the efficient and economical completion of a work of the magnitude of the Moffat tunnel.

This suit, which sought to test the validity of the lease, was brought by the D. & S. L. to enjoin the Moffat Tunnel Commission from cancelling the present lease and endeavoring to collect a higher rental. It represented another step in the lengthy litigation concerning the tunnel, which is almost entirely due to the fact that the cost of the construction of the tunnel was nearly three times the amount of the original estimates. It is expected that the commission will appeal the case to the circuit court of appeals.

Automatic Train Pipe Connectors To Be Tested

On September 19, a conference was held in the office of the director of the Bureau of Safety of the Interstate Commerce Commission at Washington for the purpose of determining upon a method of procedure and arriving at an agreement concerning tests of automatic train pipe connectors which are proposed to be made by the American Railway Association as a result of a complaint filed with the Interstate Commerce Commission by the train service brotherhoods. The American Railway Association has appropriated $100,000 to start the work. The facilities at Purdue University are available for carrying on the laboratory tests, which will be made under the direction of Harley S. Johnson, director of research of the American Railway Association.

Present at the conference were representatives of the Bureau of Safety, the American Railway Association, and the brotherhoods. It was decided that the investigation would be carried on by the American Railway Association in cooperation with the Bureau of Safety and representatives of the brotherhoods; that the detailed conduct of the investigation would be under the direction of Mr. Johnson, that the association will purchase the required number of the various devices selected for test and submit such devices to laboratory tests to determine which, if any, show sufficient merit to warrant road tests under actual service conditions, the tests to be begun after all devices purchased have been received at the laboratory. Following the completion of the laboratory tests, the devices showing sufficient merit will be submitted to road tests under actual service conditions.

The expenses of both the director of research and his staff and any expenses that may be incurred through purchase of material or conducting the tests will be borne by the railroads and cleared through the American Railway Association.

N. R. A. A. Makes Space Assignments for March Exhibit

Space was assigned by the board of directors of the National Railway Appliances Association, at a meeting on September 16, to 162 members of the organization, which will present its annual exhibit of railway supplies and devices at the Coliseum, Chicago, on March 10-14, 1930, simultaneously with the meetings of the American Railway Engineering Association and the Signal Section of the American Railway Association. The supply companies which have signified their intention of being represented at the exhibit by arranging for space at this time are:

A. C. Spark Plug Company, Flint, Mich.
Adams Motor & Manufacturing Co., Chicago.
Adams & Westlake Co., Elkhart, Ind.
Air Reduction Sales Company, New York.
Alemite Corporation, Chicago.
American Cable Company, New York.
American Car & Foundry Co., New York.
American Casting Company, Birmingham, Ala.
American Chain Company, Bridgeport, Conn.
American Fork & Hoe Co., Cleveland, Ohio.
American Hoist & Derrick Co., St. Paul, Minn.
American Railway Hydrant & Valve Co., Stapleton, S. I., N. Y.
American Rolling Mill Company, Middletown, Ohio.
American Steel & Wire Co., Chicago.
American Valve & Meter Co., Cincinnati, Ohio.
Anderson Manufacturing Company, Albert & J. M., Boston, Mass.
Armco Culvert Manufacturers Association, Middletown, Ohio.
Barber Asphalt Company, Philadelphia, Pa.
Barrett Company, New York.
Bethlehem Steel Company, Bethlehem, Pa.
Binks Spray Equipment Company, Chicago.
Buda Company, Harvey, Ill.
Carey Company, Philip, Cincinnati, Ohio.
Carnegie Steel Company, Pittsburgh, Pa.
Chicago Bridge & Iron Works, Chicago.
Chicago Pneumatic Tool Company, New York.
Chicago Railway Signal & Supply Co., Chicago.
Chipman Chemical Engineering Company, Bound Brook, N. J.
Cleveland Frog & Crossing Co., Cleveland, Ohio.
Copperweld Steel Company, Glassport, Pa.
Creepcheck Company, Hoboken, N. J.
Crerar, Adams & Co., Chicago.
Cullen-Friestedt Company, Chicago.
Curtin-Howe Corporation, New York.
Cyclone Fence Company, Waukegan, Ill.
Dearborn Chemical Company, Chicago.
Detroit Graphite Company, Detroit, Mich.
De Vilbiss Company, Toledo, Ohio.
Dickinson, Inc., Paul, Chicago.
Dilworth, Porter & Co., Pittsburgh, Pa.
Duff-Norton Manufacturing Company, Pittsburgh, Pa.
Edison Storage Battery Company, Orange, N. J.
Edison, Inc., Thos. A., Bloomfield, N. J.
Electric Storage Battery Company, Philadelphia, Pa.
Electric Tamper & Equipment Co., Chicago.
Elwell Parker Electric Company, Chicago.
Engineering News-Record, New York.
Fairbanks, Morse & Co., Chicago.
Fairmont Railway Motors, Inc., Fairmont, Minn.
Fansteel Products Company, North Chicago, Ill.
Frog Switch & Manufacturing Co., Carlisle, Pa.
Gardner-Denver Company, Quincy, Ill.
General Electric Company, Schenectady, N. Y.
General Railway Signal Company, Rochester, N. Y.
Gould Storage Battery Company, New York.
Griswold Safety Signal Company, Minneapolis, Minn.
Handlan-Buck Manufacturing Company, St. Louis, Mo.
Harnischfeger Sales Corporation, Milwaukee, Wis.
Hayes Track Appliance Company, Richmond, Ind.
Headley Good Roads Company, Philadelphia, Pa.
Hubbard & Co., Pittsburgh, Pa.
Illinois Steel Company, Chicago.
Indianapolis Switch & Frog Co., Springfield, Ohio.
Ingersoll-Rand Company, New York.
Jewell Electrical Instrument Corporation, Chicago.
Johns-Manville Corporation, New York.
Jordan Company, O. F., East Chicago, Ind.
Kahler Company, Burbank, Cal.
Kalamazoo Railway Supply Company, Kalamazoo, Mich.
K. & W. Equipment Company, Chicago.
Kerite Insulated Wire & Cable Co., New York.
Keystone Grinder & Manufacturing Co., Pittsburgh, Pa.
Koppel Industrial Car & Equipment Co., Pittsburgh, Pa.
Layne & Bowler, Inc., Memphis, Tenn.
Le Carbone Company, Hoboken, N. J.
Lehon Company, Chicago.
Locomotive Finished Material Company, Atchison, Kan.
Long, Jr., Company, Chas. R., Louisville, Ky.
Lorain Steel Company, Johnstown, Pa.
Louisville Frog, Switch & Signal Co., Louisville, Ky.

Lufkin Rule Company, Saginaw, Mich.
Lundie Engineering Corporation, New York.
Lundy Corporation, E. A., Pittsburgh, Pa.
MacLean-Fogg Lock Nut Company, Chicago.
MacRae's Blue Book Company, Chicago.
Magnetic Signal Company, Los Angeles, Cal.
Maintenance Equipment Company, Chicago.
Massey Concrete Products Corporation, Chicago.
Mechanical Manufacturing Company, Chicago.
Metal & Thermit Corporation, New York.
Metalweld, Inc., Philadelphia, Pa.
Mississippi Valley Structural Steel Company, Chicago.
Morden Frog & Crossing Works, Chicago.
Murdock Manufacturing & Supply Co., Cincinnati, Ohio.
Morrison Railway Supply Company, Buffalo, N. Y.
National Carbon Company, New York.
National Lead Company, New York.
National Lock Washer Company, Newark, N. J.
National Railway Signal Company, Boston, Mass.
National Vulcanized Fibre Company, Wilmington, Del.
Nichols & Bro., Geo. P., Chicago.
Nordberg Manufacturing Company, Milwaukee, Wis.
Northwest Engineering Company, Chicago.
Northwestern Motor Company, Eau Claire, Wis.
Ogle Construction Company, Chicago.
Ohio Brass Company, Mansfield, Ohio.
Ohio Valley Rock Asphalt Company, Louisville, Ky.
Okonite-Callender Company, Passaic, N. J.
Okonite Company, Passaic, N. J.
Oxweld Railroad Service Company, Chicago.
P. & M. Co., Chicago.
Paasche Air Brush Company, Chicago.
Page Steel & Wire Co., Bridgeport, Conn.
Pettibone Mulliken Company, Chicago.

(*Continued on page 746*)

Operating Revenues and Operating Expenses of Class I Steam Railways in the United States

Compiled from the Monthly Reports of Revenues and Expenses for 182 Steam Railways, Including 16 Switching and Terminal Companies.

FOR THE MONTH OF JULY, 1929 AND 1928

Item	United States		Eastern District		Southern District		Western District	
	1929	1928	1929	1928	1929	1928	1929	1928
Average number of miles operated	241,559.21	241,326.65	60,115.17	60,098.47	45,775.09	45,791.60	135,668.95	135,436.58
Revenues:								
Freight	$416,404,510	$382,225,812	$179,087,667	$162,760,215	$68,170,302	$66,000,167	$169,146,541	$153,465,430
Passenger	[a] 79,551,184	[b] 82,821,850	43,420,639	44,212,142	8,993,865	10,270,310	27,136,680	28,339,398
Mail	[c] 18,522,054	7,956,155	7,499,888	3,102,894	1,823,314	1,328,195	9,198,852	3,525,066
Express	11,201,679	10,420,865	5,042,087	4,792,422	1,418,704	1,149,684	4,740,888	4,478,759
All other transportat'n	18,370,552	17,873,208	10,869,436	10,193,347	1,086,101	1,076,939	6,415,015	6,602,922
Incidental	12,797,202	11,651,195	6,361,240	5,701,830	1,278,208	1,238,736	5,157,754	4,710,629
Joint facility—Cr.	1,036,229	1,174,952	300,881	475,727	168,199	180,658	567,149	518,567
Joint facility—Dr.	315,370	393,875	83,566	137,982	34,615	29,273	197,189	226,620
Railway operating revenues	557,568,040	513,730,162	252,498,272	231,100,595	82,904,078	81,215,416	222,165,690	201,414,151
Expenses:								
Maintenance of way and structures	81,710,044	77,598,331	34,784,689	31,945,058	12,585,057	12,683,663	34,340,298	32,969,610
Maintenance of equipment	101,197,896	95,942,063	47,539,105	44,535,075	17,753,335	16,788,414	35,905,456	34,618,574
Traffic	11,297,009	10,845,586	4,369,060	4,066,104	1,881,949	1,956,763	5,046,000	4,822,719
Transportation	174,806,407	171,831,099	82,724,587	80,120,531	26,137,402	26,763,035	65,944,418	64,947,533
Miscellaneous operat'ns	5,395,031	5,068,079	2,394,565	2,261,700	457,310	490,316	2,543,156	2,316,063
General	16,352,895	16,119,464	7,099,667	7,222,377	2,744,662	2,699,528	6,508,566	6,197,559
Transportation for investment—Cr.	1,497,732	1,360,894	381,449	276,500	125,262	73,119	991,021	1,011,275
Railway operating expenses	389,261,550	376,043,728	178,530,224	169,874,345	61,434,453	61,308,600	149,296,873	144,860,783
Net revenue from railway operations	168,306,490	137,686,434	73,968,048	61,226,250	21,469,625	19,906,816	72,868,817	56,553,368
Railway tax accruals	35,661,914	32,733,026	15,225,676	14,129,458	5,885,472	5,494,449	14,550,766	13,109,119
Uncollectible ry. revs.	98,550	83,177	49,677	35,134	24,119	15,334	24,754	32,709
Railway operating income	132,546,026	104,870,231	58,692,695	47,061,658	15,560,034	14,397,033	58,293,297	43,411,540
Equipment rents—Dr. balance	7,693,328	7,558,563	4,361,921	4,152,451	[d] 1,042,752	[d] 625,511	4,374,159	4,031,623
Joint facility rent—Dr. balance	2,069,889	2,081,087	1,065,064	998,972	231,270	197,890	773,555	884,225
Net railway operating income	122,782,809	95,230,581	53,265,710	41,910,235	16,371,516	14,824,654	53,145,583	38,495,692
Ratio of expenses to revenues (per cent)	69.81	73.20	70.71	73.51	74.10	75.49	67.20	71.92

FOR SEVEN MONTHS ENDED WITH JULY, 1929 AND 1928

Average number of miles operated	241,529.59	240,870.26	60,134.78	60,082.55	45,764.75	45,688.52	135,630.06	135,099.19
Revenues:								
Freight	$2,736,493,918	$2,575,335,632	$1,209,148,220	$1,123,224,939	$492,125,303	$473,848,194	$1,035,220,395	$978,262,499
Passenger	[e] 510,544,326	[f] 525,113,439	268,685,710	273,041,481	72,798,116	78,864,136	169,060,500	173,207,822
Mail	[g] 88,313,591	55,453,102	33,697,064	21,035,839	13,793,029	9,687,468	40,823,498	24,729,795
Express	83,028,066	77,577,377	37,729,316	35,541,313	13,420,249	12,036,647	31,878,501	29,999,417
All other transportat'n	122,259,499	118,128,210	70,565,848	66,685,516	8,552,706	8,328,428	43,140,945	43,114,266
Incidental	76,172,379	69,388,793	38,982,983	34,894,038	9,768,170	9,922,610	27,421,226	24,572,145
Joint facility—Cr.	7,296,866	7,820,325	2,411,735	3,062,068	1,111,956	1,102,676	3,773,175	3,655,581
Joint facility—Dr.	2,284,174	2,636,635	570,554	928,749	240,478	243,289	1,473,142	1,464,597
Railway operating revenues	3,621,824,471	3,426,180,243	1,660,650,322	1,556,556,445	611,329,051	593,546,870	1,349,845,098	1,276,076,928
Expenses:								
Maintenance of way and structures	495,193,587	487,009,331	204,455,158	199,108,345	87,949,580	85,858,436	202,788,849	202,042,550
Maintenance of equipment	704,213,902	682,861,599	335,599,365	318,456,350	122,539,349	122,664,224	246,075,188	241,741,025
Traffic	75,881,961	73,648,955	28,612,568	27,342,415	13,906,259	14,165,558	33,363,134	32,140,982
Transportation	1,220,106,811	1,204,993,721	578,125,573	566,814,785	193,526,741	196,859,631	448,454,497	441,319,305
Miscellaneous operat'ns	34,092,522	32,430,852	15,605,444	15,154,810	4,021,970	4,274,865	14,465,108	13,001,177
General	113,495,656	113,329,601	49,434,576	50,741,826	19,091,045	18,940,181	44,970,035	43,647,594
Transportation for investment—Cr.	7,176,811	8,674,223	1,630,551	1,374,587	532,142	763,363	5,014,118	6,536,273
Railway operating expenses	2,635,807,628	2,585,599,836	1,210,202,133	1,176,243,944	440,502,802	441,999,532	985,102,693	967,356,360
Net revenue from railway operations	986,016,843	840,580,407	450,448,189	380,312,501	170,826,249	151,547,338	364,742,405	308,720,568
Railway tax accruals	232,510,719	215,505,500	97,749,732	90,233,839	42,542,347	40,362,716	92,218,640	84,908,945
Uncollectible ry. revs.	678,134	766,346	277,409	386,199	152,293	127,709	248,432	252,438
Railway operating income	752,827,990	624,308,561	352,421,048	289,692,463	128,131,609	111,056,913	272,275,333	223,559,185
Equipment rents—Dr. balance	53,002,229	52,444,834	29,349,278	28,713,304	[d] 184,185	374,628	23,837,136	23,356,902
Joint facility rent—Dr. balance	14,317,569	14,217,722	7,073,021	7,207,998	1,400,349	1,258,704	5,844,199	5,751,020
Net railway operating income	685,508,192	557,646,005	315,998,749	253,771,161	126,915,445	109,423,581	242,593,998	194,451,263
Ratio of expenses to revenues (per cent)	72.78	75.47	72.88	75.57	72.06	74.47	72.98	75.81

[a] Includes $3,549,598 sleeping and parlor car surcharge. [b] Includes $3,433,790 sleeping and parlor car surcharge. [c] Includes approximately $9,406,013 back railway mail pay. [d] Deficit or other reverse items. [e] Includes $23,568,194 sleeping and parlor car surcharge. [f] Includes $22,863,713 sleeping and parlor car surcharge. [g] Includes approximately $23,709,218 back railway mail pay.

Compiled by the Bureau of Statistics, Interstate Commerce Commission. Subject to revision.

Operating Statistics of Large Steam Railways — Selected Items for July, 1929, Comp

Region, road and year	Average miles of road operated	Train-miles	Locomotive-miles: Principal and helper	Locomotive-miles: Light	Car-miles: Loaded (thousands)	Car-miles: Per cent loaded	Ton-miles (thousands): Gross. Excluding locomotives and tenders	Ton-miles (thousands): Net. Revenue and non-revenue	Average number of locomotives on line: Serviceable	Unserviceable	Per cent unserviceable	Stored
New England Region:												
Boston & Albany 1929	407	202,975	214,102	21,100	5,105	66.5	267,041	97,858	104	18	14.8	41
1928	407	183,070	194,733	20,366	4,906	67.8	249,023	91,747	94	27	22.2	30
Boston & Maine 1929	2,059	388,886	447,468	56,083	12,880	70.9	645,590	252,491	250	38	13.2	55
1928	2,074	378,789	446,402	56,735	12,018	71.5	591,624	229,019	270	55	17.0	57
N. Y., New H. & Hart. 1929	2,103	509,676	582,155	38,769	16,551	66.4	882,111	345,750	282	64	18.5	15
1928	2,122	538,291	599,701	34,971	16,072	66.8	850,819	334,238	304	55	15.2	44
Great Lakes Region:												
Delaware & Hudson 1929	875	317,180	419,030	43,285	10,082	63.8	604,331	277,075	239	32	11.7	91
1928	875	299,151	402,046	47,560	9,248	63.8	551,959	251,689	250	37	12.8	111
Del., Lack. & Western 1929	998	475,019	523,221	56,403	16,595	66.9	914,487	365,826	242	51	17.3	81
1928	998	470,607	523,427	59,524	15,422	68.8	937,025	340,364	252	53	17.4	46
Erie (inc. Chi. & Erie) 1929	2,317	887,414	953,401	62,699	39,034	63.2	2,311,944	906,513	384	95	19.9	38
1928	2,317	868,167	938,978	81,902	37,278	63.5	2,187,361	858,984	409	117	22.3	4n
Lehigh Valley 1929	1,343	510,491	555,163	57,994	16,185	64.6	957,148	404,718	279	83	23.0	6r
1928	1,346	519,021	567,193	56,236	16,436	64.1	973,669	414,115	336	95	22.1	71
Michigan Central 1929	1,822	533,705	534,411	17,098	18,283	59.3	1,061,101	370,803	194	36	15.6	30
1928	1,822	533,846	537,624	16,185	18,776	61.3	1,053,106	372,718	205	65	24.2	35
New York Central 1929	6,467	1,981,046	2,180,665	155,832	78,063	62.1	4,702,506	1,995,519	978	318	24.5	210
1928	6,459	1,914,286	2,132,977	153,910	74,334	62.1	4,479,625	1,883,182	1,024	366	26.3	283
New York, Chi. & St. L. 1929	1,665	674,244	681,464	6,242	21,851	63.1	1,244,889	466,251	198	68	25.5	23
1928	1,665	571,725	578,825	6,517	19,300	63.3	1,079,917	399,977	231	54	19.0	74
Pere Marquette 1929	2,178	489,852	493,309	5,259	12,535	61.3	754,072	317,056	184	31	14.6	...
1928	2,181	427,879	431,450	5,263	11,150	62.5	670,340	288,734	177	37	17.4	14
Pitts. & Lake Erie 1929	231	143,806	145,227	1,277	5,193	63.3	408,542	237,144	50	12	19.4	9
1928	231	113,225	116,510	1,698	4,161	60.7	347,784	198,646	53	19	25.7	12
Wabash 1929	2,497	893,059	929,087	18,086	27,033	63.7	1,555,736	578,440	305	61	16.8	15
1928	2,497	779,486	810,674	12,700	24,170	64.4	1,363,572	514,195	302	56	15.7	57
Central Eastern Region:												
Baltimore & Ohio 1929	5,536	1,962,184	2,299,420	164,123	60,176	61.9	4,021,472	1,886,706	985	177	15.2	118
1928	5,534	1,852,347	2,192,116	176,262	55,716	61.2	3,730,149	1,748,993	1,010	252	20.0	180
Central of New Jersey 1929	691	260,990	279,219	43,723	7,359	57.9	484,207	215,034	175	32	15.4	32
1928	691	244,796	264,424	43,624	7,106	59.6	457,668	208,770	175	38	17.7	29
Chicago & Eastern Ill. 1929	946	241,813	242,399	2,977	6,799	65.9	399,545	175,827	94	69	42.3	30
1928	945	240,389	240,941	3,642	6,478	65.4	374,640	160,605	113	57	33.4	48
Clev., Cin., Chi. & St. L. 1929	2,371	750,332	772,277	15,630	24,278	61.2	1,554,110	702,694	311	115	27.0	24
1928	2,370	719,428	745,470	16,463	22,775	61.4	1,470,755	656,369	336	108	24.4	64
Elgin, Joliet & Eastern 1929	453	144,196	152,363	6,232	4,073	64.5	305,638	160,546	76	11	13.1	...
1928	461	123,635	130,567	5,025	3,593	64.6	263,957	125,328	79	10	11.3	4
Long Island 1929	400	54,667	57,525	12,792	547	53.4	37,143	14,177	48	5	9.8	2
1928	396	48,178	48,683	12,177	527	54.8	35,507	13,759	60	9	12.9	...
Pennsylvania System 1929	10,738	4,202,859	4,815,096	444,805	150,547	63.2	10,084,143	4,669,834	2,581	303	10.5	556
1928	10,758	3,975,391	4,521,641	394,901	139,742	64.4	9,001,315	4,104,354	2,772	347	11.1	768
Reading 1929	1,451	602,464	657,844	47,519	16,503	60.8	1,122,218	541,968	328	63	16.0	64
1928	1,416	588,572	648,646	47,977	15,885	59.8	1,099,964	535,901	325	80	19.8	73
Pocahontas Region:												
Chesapeake & Ohio 1929	2,734	1,073,894	1,144,767	43,344	37,491	55.9	3,044,807	1,632,896	528	94	15.2	80
1928	2,723	1,049,947	1,126,808	40,643	35,550	56.2	2,881,491	1,545,834	543	95	14.8	106
Norfolk & Western 1929	2,230	849,698	951,056	35,655	32,424	57.6	2,744,371	1,470,699	465	55	10.6	95
1928	2,231	819,469	950,971	29,383	30,616	57.5	2,567,966	1,363,853	524	50	8.8	166
Southern Region:												
Atlantic Coast Line 1929	5,153	562,027	562,448	7,615	13,315	58.8	762,835	282,283	410	59	12.6	101
1928	5,127	609,505	611,586	8,399	15,569	59.0	864,139	303,988	440	52	10.5	96
Central of Georgia 1929	1,900	294,681	296,124	5,401	7,117	68.2	378,143	149,216	132	18	12.0	10
1928	1,898	341,486	344,712	7,074	7,753	64.7	428,923	153,585	149	18	10.7	5
Ill. Cent. (inc. Y. & M. V.) 1929	6,701	1,855,090	1,866,122	27,505	50,256	62.2	3,215,730	1,323,932	738	120	14.0	18
1928	6,738	1,845,147	1,863,166	29,450	50,695	61.8	3,244,246	1,319,911	761	97	11.3	56
Louisville & Nashville 1929	5,247	1,595,653	1,686,233	55,127	34,956	58.7	2,394,200	1,119,255	576	122	17.5	46
1928	5,242	1,708,273	1,777,636	59,745	36,641	59.5	2,479,106	1,162,639	626	109	14.9	67
Seaboard Air Line 1929	4,475	523,370	542,276	4,710	12,986	62.7	733,545	280,740	266	46	14.8	19
1928	4,485	536,125	554,370	5,995	13,182	61.1	754,352	276,785	269	60	18.3	19
Southern 1929	6,679	1,429,117	1,458,902	28,820	35,938	64.2	1,990,444	783,962	833	126	13.2	177
1928	6,718	1,544,583	1,575,793	32,655	37,372	62.3	2,103,398	809,763	876	101	10.3	147
Northwestern Region:												
Chi. & North Western 1929	8,467	1,439,249	1,503,716	25,974	37,299	61.8	2,274,220	876,246	728	90	11.0	74
1928	8,463	1,406,167	1,478,373	23,043	36,674	62.3	2,194,988	861,514	754	135	15.2	100
Chi., Milw., St. P. & Pac. 1929	11,244	1,719,866	1,841,448	103,230	52,389	63.1	3,136,626	1,325,386	783	131	14.4	155
1928	11,248	1,633,317	1,748,302	106,403	49,948	62.8	2,946,349	1,223,962	796	124	13.4	167
Chi., St. P., Minn. & Om. 1929	1,724	300,591	319,357	13,714	6,379	65.6	357,298	144,364	138	31	18.4	21
1928	1,724	291,054	310,122	12,840	6,193	65.7	339,576	135,832	150	30	16.5	23
Great Northern 1929	8,374	882,833	908,221	57,002	33,401	63.1	2,136,694	1,028,961	454	155	25.4	45
1928	8,305	802,512	827,248	60,383	29,945	64.8	1,845,018	889,443	510	132	20.6	81
Minn., St. P. & S. St. M. 1929	4,357	465,231	480,579	7,423	13,472	67.9	736,352	330,353	184	52	21.9	9
1928	4,358	476,484	491,587	5,455	13,050	65.4	705,797	300,631	206	38	15.5	20
Northern Pacific 1929	6,476	884,082	940,250	54,381	27,306	66.1	1,566,586	644,705	438	119	21.3	33
1928	6,414	826,766	875,952	49,645	26,532	68.9	1,485,731	629,325	413	152	26.9	29
Oreg.-Wash. R. R. & Nav. 1929	2,246	212,668	223,072	15,014	6,141	67.2	355,999	152,534	117	13	9.9	21
1928	2,246	203,581	213,824	14,520	5,761	67.9	340,157	150,732	122	19	13.3	15
Central Western Region:												
Atch., Top. & S. Fe (incl. 1929	10,497	2,022,493	2,203,391	105,583	65,164	60.3	4,252,409	1,657,544	760	144	15.9	77
P. & S. F.) 1928	10,454	1,860,410	2,039,285	111,115	62,658	62.4	3,194,243	1,496,394	791	130	14.1	139
Chicago & Alton 1929	1,000	324,818	355,974	3,315	8,087	63.4	489,994	183,680	126	22	15.0	10
1928	1,000	310,376	346,462	3,541	7,729	64.9	459,198	173,362	115	37	24.1	13
Chi., Burl. & Quincy 1929	9,317	1,450,996	1,546,097	66,885	45,585	63.0	2,703,724	1,228,770	695	155	18.2	45
1928	9,317	1,368,324	1,416,202	53,129	42,955	64.8	2,470,976	1,120,048	732	159	17.9	78
Chi., Rock I. & Pacific 1929	7,548	1,742,890	1,875,100	19,730	42,161	62.7	2,615,294	1,109,727	567	108	16.0	14
1928	7,566	1,557,879	1,666,001	19,458	39,814	65.8	2,341,690	1,002,397	574	103	15.2	35
Denver & R. G. Wn. 1929	2,564	218,643	249,002	35,971	6,591	71.7	373,898	169,488	230	42	15.5	52
1928	2,563	221,693	254,116	40,616	6,578	70.1	366,525	164,241	227	41	15.1	36
Oregon Short Line 1929	2,539	290,262	299,123	18,252	8,571	64.7	502,974	207,613	173	7	3.8	64
1928	2,539	272,944	289,949	24,828	8,021	67.0	469,210	200,957	152	26	14.4	21
So. Pacific—Pacific Lines 1929	8,710	1,746,545	1,899,168	246,381	54,568	62.1	3,378,490	1,178,837	705	184	20.7	67
1928	8,740	1,675,493	1,823,551	272,508	52,842	62.7	3,205,708	1,127,768	730	187	20.4	53
Union Pacific 1929	3,765	1,050,401	1,077,664	56,338	37,420	64.2	2,214,465	831,303	373	57	13.2	84
1928	3,715	1,024,977	1,050,171	53,554	39,259	63.0	2,308,155	789,504	386	64	14.1	98
Southwestern Region:												
Gulf, Colo. & S. Fe 1929	1,933	362,739	396,143	12,959	12,280	66.6	844,763	432,848	115	16	12.2	8
1928	1,933	252,233	261,049	5,722	8,242	66.0	519,808	244,343	132	18	11.9	45
Mo.-Kans.-Texas Lines 1929	3,176	506,982	535,401	11,413	16,440	58.8	1,028,427	415,087	199	46	18.8	66
1928	3,176	488,852	509,318	18,808	16,243	59.1	998,875	400,379	207	41	16.6	70
Missouri Pacific 1929	7,433	1,489,025	1,555,684	49,488	43,663	65.7	2,615,950	1,124,447	561	73	11.6	138
1928	7,433	1,385,543	1,434,554	48,717	40,779	65.2	2,417,809	1,033,987	553	93	14.4	29
St. Louis-San Francisco 1929	5,213	879,243	895,069	10,988	21,368	62.9	1,284,789	531,043	409	59	12.5	38
1928	5,076	850,430	864,038	12,059	20,521	61.5	1,257,522	525,453	398	47	10.6	50
Texas & New Orleans 1929	4,709	864,205	871,873	1,082	18,952	62.2	1,159,352	432,215	282	56	16.6	48
1928	4,708	763,798	767,731	2,278	16,592	66.3	961,392	389,887	266	71	21.1	38
Texas & Pacific 1929	2,015	553,250	553,256	14,253	14,383	59.6	914,066	329,025	184	26	12.4	10
1928	2,015	580,975	580,975	9,729	15,083	57.6	1,005,799	390,715	199	16	7.6	16

Compiled by the Bureau of Statistics, Interstate Commerce Commission. Subject to revision.

ared with July, 1928, for Roads with Annual Operating Revenues Above $25,000,000

Region, road and year	Average number of freight cars on line: Home	Foreign	Total	Per cent unserviceable	Gross ton-miles per train-hour, excluding locomotives and tenders	Gross tons per train, excluding locomotives and tenders	Net tons per train	Net tons per loaded car	Net ton-miles per car-day	Car miles per car-day	Net ton-miles per mile of road per day	Pounds of coal per 1,000 gross ton-miles, including locomotives and tenders	Locomotive miles per locomotive-day
New England Region:													
Boston & Albany.....1929	3,257	5,268	8,525	10.5	18,659	1,316	482	19.2	370	29.0	7,754	159	62.0
1928	2,515	4,939	7,454	4.1	19,268	1,360	501	18.7	397	31.3	7,271	154	57.2
Boston & Maine.....1929	9,805	12,135	21,940	5.3	20,104	1,660	649	19.6	371	26.7	3,955	107	56.4
1928	12,225	10,481	22,706	5.5	18,134	1,562	605	19.1	325	23.9	3,562	111	50.0
N. Y., New H. & Hart..1929	15,195	15,494	30,689	8.7	21,880	1,731	678	20.9	363	26.2	5,304	98	57.9
1928	17,497	16,335	33,832	8.4	20,755	1,581	621	20.8	319	23.0	5,081	105	57.1
Great Lakes Region:													
Delaware & Hudson.....1929	10,020	5,900	15,920	4.1	24,932	1,905	874	27.5	561	32.0	10,215	126	55.2
1928	9,933	5,040	14,973	4.3	23,746	1,845	841	27.2	542	31.2	9,279	132	50.6
Del., Lack. & Western...1929	16,330	7,700	24,030	4.5	24,790	1,925	770	22.0	491	33.3	11,823	121	63.8
1928	18,429	6,666	25,095	4.3	22,442	1,779	723	22.1	438	28.8	11,003	121	61.7
Erie (inc. Chi. & Erie)..1929	29,308	20,260	49,568	5.1	34,375	2,605	1,022	23.2	590	40.2	12,622	101	68.4
1928	31,530	17,954	49,484	4.1	32,819	2,520	989	23.0	560	38.3	11,960	109	62.6
Lehigh Valley 1929	20,883	9,090	29,973	8.4	27,032	1,875	793	25.0	436	26.9	9,718	139	54.6
1928	24,363	8,986	33,349	12.9	26,462	1,876	798	25.2	401	24.8	9,925	139	46.7
Michigan Central.....1929	16,488	17,875	34,363	5.0	31,934	1,988	695	20.3	348	29.0	6,565	100	77.3
1928	19,952	15,409	35,361	4.9	31,317	1,973	698	19.9	340	27.9	6,599	98	66.2
New York Central.....1929	64,652	84,196	148,848	4.6	32,398	2,374	1,007	25.6	432	27.2	9,954	95	58.2
1928	70,700	69,169	139,869	6.5	31,451	2,340	984	25.3	434	27.6	9,405	97	53.1
New York, Chi. & St. L..1929	12,907	11,453	24,360	7.2	27,037	1,846	692	21.3	617	45.9	9,035	97	83.5
1928	14,587	9,287	23,874	5.7	27,225	1,889	700	20.7	540	41.2	7,750	97	66.2
Pere Marquette 1929	9,394	9,977	19,371	3.2	20,627	1,539	647	25.3	528	34.0	4,696	92	74.7
1928	11,185	8,163	19,348	4.0	20,321	1,567	675	25.9	481	29.8	4,271	93	65.8
Pitts. & Lake Erie.....1929	11,666	9,809	21,475	6.4	33,753	2,841	1,649	45.7	356	12.3	33,077	86	75.7
1928	15,814	7,193	23,007	4.9	34,806	3,072	1,754	47.7	279	9.6	27,708	94	53.0
Wabash 1929	14,264	14,299	28,563	2.6	28,726	1,742	648	21.4	653	47.9	7,474	104	83.5
1928	15,913	11,909	27,822	2.9	28,806	1,749	660	21.3	596	43.5	6,643	107	74.2
Central Eastern Region:													
Baltimore & Ohio.....1929	70,116	31,560	101,676	6.9	23,576	2,049	962	31.4	599	30.8	10,993	132	68.4
1928	75,453	28,378	103,831	5.6	23,651	2,014	944	31.4	543	28.3	10,194	134	60.5
Central of New Jersey...1929	17,429	10,485	27,914	6.8	22,560	1,855	824	29.2	248	14.7	10,045	134	50.3
1928	19,157	10,222	29,379	4.2	20,781	1,870	853	29.4	229	13.1	9,746	140	46.8
Chicago & Eastern Ill....1929	12,810	4,473	17,283	41.6	25,097	1,652	727	25.9	328	19.2	5,994	113	48.5
1928	13,603	3,823	17,426	32.1	22,868	1,558	668	24.8	297	18.3	5,482	123	46.4
Clev., Cin., Chi. & St. L..1929	20,806	19,989	40,795	5.3	30,430	2,071	937	28.9	556	31.4	9,560	103	59.7
1928	24,186	19,736	43,922	4.3	27,946	2,044	912	28.8	482	27.2	8,932	108	55.3
Elgin, Joliet & Eastern..1929	8,657	7,821	16,478	7.0	16,212	2,120	1,113	39.4	314	12.4	11,427	116	58.8
1928	9,416	6,692	16,108	5.7	16,255	2,135	1,095	37.7	271	11.1	9,478	115	49.1
Long Island 1929	1,074	4,314	5,388	2.2	5,488	679	259	25.9	85	6.1	1,142	365	42.8
1928	1,672	3,785	5,457	1.3	4,779	737	286	26.1	81	5.7	1,121	314	28.5
Pennsylvania System.....1929	210,390	90,232	300,622	5.3	28,759	2,399	1,111	31.0	501	25.5	14,028	113	58.8
1928	220,970	81,555	302,525	6.5	26,729	2,264	1,032	29.4	438	23.2	12,308	114	50.8
Reading 1929	28,834	14,103	42,937	5.5	21,972	1,863	900	32.8	407	20.4	12,047	135	58.2
1928	31,410	11,962	43,372	5.5	21,321	1,869	911	33.7	399	19.8	12,206	138	55.4
Pocahontas Region:													
Chesapeake & Ohio.....1929	29,261	11,184	40,445	2.7	35,666	2,835	1,521	43.6	1,302	53.5	19,269	80	61.6
1928	31,207	8,751	39,958	3.1	34,438	2,744	1,472	43.5	1,248	51.1	18,310	83	59.1
Norfolk & Western.....1929	29,151	9,051	38,202	1.5	44,764	3,230	1,731	45.4	1,242	47.5	21,273	112	61.2
1928	30,677	8,333	39,010	1.3	43,781	3,134	1,664	44.5	1,128	44.0	19,716	116	55.0
Southern Region:													
Atlantic Coast Line.....1929	20,061	6,561	26,622	6.3	19,684	1,357	502	21.2	342	27.4	1,767	105	39.2
1928	21,261	6,706	27,967	6.0	20,292	1,418	499	19.5	351	30.4	1,913	104	40.6
Central of Georgia.....1929	4,730	5,044	9,774	4.7	18,676	1,283	506	21.0	492	34.4	2,533	127	64.8
1928	5,341	6,418	11,759	2.7	17,707	1,256	450	19.8	421	32.9	2,611	130	68.0
Ill. Cent. (inc. Y.&M. V.)1929	39,152	20,360	59,512	5.0	24,831	1,733	714	26.3	718	43.8	6,374	119	71.2
1928	44,223	19,847	64,070	7.7	24,507	1,758	715	26.0	665	41.3	6,319	120	71.2
Louisville & Nashville....1929	43,712	14,429	58,141	10.5	20,449	1,500	701	32.0	621	33.1	6,881	131	80.5
1928	44,920	15,403	60,323	9.6	19,615	1,451	681	31.7	622	32.9	7,155	133	80.6
Seaboard Air Line.....1929	14,332	6,106	20,438	6.9	18,828	1,402	536	21.6	443	32.7	2,024	123	56.6
1928	14,952	7,091	22,043	7.7	18,508	1,407	516	21.0	405	31.6	1,991	128	55.0
Southern 1929	47,538	15,842	63,380	10.3	20,373	1,393	549	21.8	399	28.5	3,787	144	50.1
1928	48,650	16,061	64,711	8.5	19,323	1,362	524	21.7	404	29.9	3,888	146	53.1
Northwestern Region:													
Chi. & North Western...1929	47,001	28,400	75,401	7.2	20,466	1,580	609	23.5	375	25.8	3,338	116	60.3
1928	48,257	27,733	75,990	6.5	20,490	1,561	613	23.5	366	25.0	3,284	114	54.5
Chi., Mil., St. P. & Pac..1929	48,106	25,787	73,893	3.1	23,821	1,824	771	25.3	579	36.2	3,803	115	68.6
1928	49,218	22,116	71,334	3.4	23,498	1,804	749	24.5	553	35.9	3,510	116	65.1
Chi., St. P., Minn. & Om..1929	2,372	9,015	11,387	6.6	15,535	1,189	480	22.6	409	27.6	2,702	109	63.7
1928	2,601	8,518	11,119	7.1	14,903	1,167	467	21.9	394	27.3	2,542	112	57.9
Great Northern 1929	40,553	11,166	51,719	6.2	30,978	2,420	1,166	30.8	642	33.0	3,964	107	51.1
1928	41,055	9,871	50,926	5.5	28,566	2,299	1,108	29.7	563	29.3	3,455	111	44.6
Minn., St. P. & S. St. M..1929	19,407	5,982	25,389	4.3	19,334	1,583	710	24.5	427	25.6	2,446	90	67.0
1928	20,110	6,128	26,238	5.3	17,691	1,481	631	23.0	378	25.1	2,225	95	65.7
Northern Pacific.....1929	37,529	7,575	45,104	8.5	24,754	1,772	729	23.6	461	29.5	3,211	134	57.6
1928	38,363	7,034	45,397	7.6	24,701	1,797	761	23.7	447	27.4	3,165	137	52.9
Ore.-Wash. R.R. & Nav..1929	7,175	5,940	13,115	4.5	22,807	1,674	717	24.8	375	22.5	2,191	149	59.2
1928	8,366	4,668	13,034	6.2	21,521	1,671	740	26.2	373	21.0	2,165	154	52.3
Central Western Region:													
Atch., Top. & S. Fe (incl. 1929	57,232	28,187	85,419	5.4	30,617	2,103	820	25.4	626	40.8	5,094	98	82.5
P. & S. F.).....1928	61,520	24,534	86,054	4.9	30,043	2,104	804	23.9	561	37.7	4,617	100	75.3
Chicago & Alton.....1929	9,821	4,766	14,587	5.4	23,571	1,509	565	22.7	406	28.2	5,927	122	78.4
1928	10,601	4,373	14,974	4.1	22,202	1,479	559	22.4	373	25.6	5,594	122	74.5
Chi., Burl. & Quincy....1929	43,179	23,309	66,488	5.8	24,839	1,863	847	27.0	596	35.1	4,254	112	61.2
1928	48,067	20,040	68,107	5.6	24,002	1,806	819	26.1	530	31.4	3,878	113	53.2
Chi., Rock I. & Pacific..1929	28,719	27,454	56,173	5.1	20,107	1,501	637	26.3	637	38.6	4,743	128	90.5
1928	31,274	20,277	51,551	6.6	19,727	1,503	643	25.2	627	37.9	4,274	126	80.3
Denver & R. G. Wn.....1929	10,984	4,089	15,073	3.1	20,394	1,710	775	25.7	363	19.7	2,133	159	33.9
1928	11,803	3,652	15,455	3.8	19,329	1,653	741	25.0	343	19.6	2,071	171	35.5
Oregon Short Line.....1929	6,854	4,185	11,039	6.2	25,520	1,733	715	24.2	607	38.7	2,638	109	56.8
1928	7,101	4,071	11,172	5.3	24,199	1,719	736	25.1	580	34.6	2,553	105	57.3
So. Pacific—Pacific Lines.1929	36,976	32,285	69,261	5.3	25,875	1,934	675	21.6	549	40.9	4,366	113	77.9
1928	37,798	30,350	68,148	5.2	24,329	1,913	673	21.3	534	39.9	4,163	115	73.8
Union Pacific 1929	23,145	9,941	33,086	7.9	36,730	2,108	791	22.2	811	56.8	7,122	97	85.0
1928	24,166	10,157	34,323	8.1	38,718	2,252	770	20.1	742	58.5	6,856	98	79.1
Southwestern Region:													
Gulf, Colo. & S. Fe.....1929	12,601	6,172	18,773	3.8	34,413	2,329	1,193	35.2	744	31.7	7,223	82	100.9
1928	9,210	4,485	13,695	3.6	30,496	2,061	969	29.6	576	29.4	4,078	86	57.4
Mo.-Kans.-Texas Lines...1929	16,031	8,350	24,381	6.0	28,774	2,029	819	25.2	549	37.0	4,215	86	72.1
1928	16,716	7,845	24,561	6.6	28,380	2,043	819	24.6	526	36.1	4,066	88	68.7
Missouri Pacific.....1929	30,126	25,668	55,794	5.0	24,031	1,757	755	25.8	650	38.5	4,880	117	81.6
1928	30,523	21,690	52,213	6.0	23,965	1,745	746	25.4	639	38.7	4,487	115	74.1
St. Louis-San Francisco..1929	23,252	10,430	33,682	3.5	20,039	1,461	604	24.9	509	32.5	3,286	129	62.5
1928	24,540	9,303	33,843	3.3	19,909	1,479	618	25.6	501	31.8	3,339	135	63.6
Texas & New Orleans...1929	10,562	15,095	25,747	4.3	20,732	1,342	500	22.8	542	38.2	2,961	91	83.3
1928	11,478	13,558	25,036	5.8	19,082	1,259	510	23.5	503	32.3	2,671	95	73.6
Texas & Pacific.....1929	5,109	8,168	13,277	4.8	23,509	1,652	595	22.9	799	58.6	5,267	92	87.0
1928	6,797	9,286	16,083	4.7	23,945	1,731	673	25.9	784	52.5	6,255	92	88.5

News of the Week

(Continued from page 743)

Pittsburgh Plate Glass Company, Newark, N. J.
Pocket List of Railroad Officials, New York.
Positive Rail Anchor Company, Chicago.
Prendergast Company, Marion, Ohio.
Pyle-National Company, Chicago.
Q. & C. Co., New York.
Racor Pacific Frog & Switch Co., Los Angeles, Cal.
Rail Joint Company, New York.
Railroad Accessories Corporation, New York.
Railroad Supply Company, Chicago.
Railway Maintenance Corporation, Pittsburgh, Pa.
Railway Purchases & Stores, Chicago.
Ramapo Ajax Corporation, New York.
Rawls Manufacturing Company, Streator, Ill.
Reade Manufacturing Company, Jersey City, N. J.
Reliance Manufacturing Company, Massillon, Ohio.
Richards-Wilcox Manufacturing Company, Aurora, Ill.
Roberts Company, Geo. J., Dayton, Ohio.
Roberts & Schaefer Co., Chicago.
Robertson Company, H. H., Pittsburgh, Pa.
Roller-Smith Company, New York.
Rome Wire Company, Rome, N. Y.
Sellers Manufacturing Company, Chicago.
Signal Accessories Corporation, Utica, N. Y.
Simmons-Boardman Publishing Company, New York.
Sivyer Steel Castings Company, Milwaukee, Wis.
Skelton Shovel Company, St. Louis, Mo.
Snap-On Wrench Company, Chicago.
Snow Construction Company, Chicago.
Standard Automatic Signal Corporation, Chicago.
Standard Oil Company of Indiana, Chicago.
Syntron Company, Pittsburgh, Pa.
Templeton, Kenly & Co., Chicago.
Toncan Culvert Manufacturers Association, Massillon, Ohio.
Transportation Publishing Company, Los Angeles, Cal.
United States Graphite Company, Saginaw, Mich.
U. S. Wind Engine & Pump Co., Batavia, Ill.
Union Switch & Signal Co., Swissvale, Pa.
Verona Tool Works, Pittsburgh, Pa.
Waterbury Battery Company, Waterbury, Conn.
Warren Tool & Forge Co., Warren, Ohio.
Western Wheeled Scraper Company, Aurora, Ill.
Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.
Weston Electrical Instrument Corporation, Chicago.
Wharton, Jr., & Co., Wm., Chicago.
Woodings Forge & Tool Co., Verona, Pa.
Woolery Machine Company, Minneapolis, Minn.
Wyoming Shovel Works, Wyoming, Pa.

General Foremen's Exhibit

A total of 76 railway supply companies contributed to an exhibit of car and locomotive appliances and shop equipment in connection with the annual convention of the International Railway General Foremen's Association held at the Hotel Sherman, Chicago, September 17 to 20, inclusive.

The exhibition was held under the auspices of the Association of Railway Supply Men, and comprised three more exhibitors than at last year's convention. A total of 177 representatives of the various supply companies were in attendance.

The following officers were elected to serve the Supply Men's Association during the coming year: President, E. H. Weaver, Westinghouse Air Brake Company, Chicago; secretary treasurer, J. W. Fogg, MacLean-Fogg Lock Nut Company, Chicago. Two new members were elected to serve on the executive committee which now consists of R. T. Peabody, Air Reduction Sales Company, New York; Fred Ehredt, Nathan Manufacturing Company; W. A. Ross, Pyle National Company, and Roger Milnes, Dearborn Chemical Company.

The list of the exhibiting companies, products on exhibition and representatives in attendance is as follows:

Air Reduction Sales Company, New York City.—Oxygen, acetylene and cutting and welding torches. Represented by E. M. Sexton, B. N. Law, R. T. Peabody, J. W. Kenefic, T. M. Hamer, A. C. Ackerman, John Callahan, G. E. Harche and F. B. Laucks.

Alemite Corporation, Chicago.—Locomotive lubrication for valve gear, shoes and wedges, spring and brake rigging, stoker, radial buffer, bell hinges, reverse gear, pedestals and main and side rods. Represented by C. A. Fine, N. J. Kamen and J. H. Karow.

American Brake Shoe & Foundry Co., Chicago.—Brake shoes. Represented by F. P. Biggs, J. W. Waters and C. F. Weil.

Ampco Twist Drill Company, Jackson, Mich.—Standard and special high-speed drills and reamers, and lathe mandrels. Represented by R. T. Rice, V. C. Baker and J. Watts.

The Ashton Valve Company, Boston, Mass.—Wheel-press recording gage, locomotive driving-wheel quartering gage, dead-weight pressure-gage tester, and safety valves. Represented by C. Gaston and J. F. Gettrust.

Barco Manufacturing Company, Chicago.—Power reverse gears, automatic smokebox blower fitting, lubricated plug valves, engine and tender connections, metallic car steam-heat connections, reservoir and headlight flexible joints. Represented by C. T. Mellor, C. O. Jenista and J. L. McLean.

The Borden Company, Warren, Ohio.—Power-drive die stocks and square-end pipe cutter. Represented by V. M. Gaspar.

Buckeye Portable Tool Company, Dayton, Ohio.—Pneumatic drills, grinders, sanders, buffers, screw drivers and nut setters. Represented by W. R. Gummere and H. W. Leighton.

Chicago Pneumatic Tool Company, New York City.—Pneumatic drills and hammers, high-frequency electric tools, hose couplings and accessories. Represented by J. L. Rowe, H. R. Deubel, R. W. Nolan, L. F. Duffy and F. O. Duffy.

Clark Manufacturing Company, Philadelphia, Pa.—Piston parters, frame-bolt jack and wheel pivot. Represented by H. J. Smith.

Cleveland Pneumatic Tool Company, Cleveland, Ohio.—Chipping hammers, riveting hammers, air drills, valve and portable grinders, pressure-seated air valves and air hose couplings. Represented by C. J. Albert.

Crucible Steel Company of America, Chicago.—Tools and tool steel. Represented by F. Bakersfield, Wm. Stevenson and J. H. Jones.

Davis Boring Tool Company, Inc., St. Louis, Mo.—Boring tools and blocks, special reamers for locomotive crossheads and knuckle-pin work. Represented by P. S. Smith.

Dayton Pneumatic Tool Corporation, Dayton, Ohio.—Nail driver. Represented by E. C. George.

Dearborn Chemical Company, Chicago.—Water treating plants and rust preventing material. Represented by R. F. Carr, C. M. Hoffman, L. P. Bowen, F. B. Horstmann, S. E. Moore and R. Q. Milnes.

Detroit Lubricator Company, Detroit, Mich.—Mechanical oiler with thermostatic heat control, terminal check, automatic oil-feed adjuster, adjustable heat control, automatic pendulum-type flange oiler, flange-oiler feed nozzle and locomotive lubricators. Represented by S. A. Witt, E. F. Mildank, W. D. Knox and C. E. Sperry.

Dewalt Products Corporation, Chicago.—Saws for cutting wood, steel, brass, tubing, stone, copper, marble, slate, Bakelite, tile, brick, fibre and other materials of like nature. Represented by L. J. McLaughlin, R. S. Lingard, D. W. Lingard and W. O. Newman.

Paul Dickinson, Inc., Chicago.—Camp- and caboose-car jacks, roof drains, exhaust heads and ventilators. Represented by A. J. Filkins and A. E. Engman.

The Duff-Norton Manufacturing Company, Pittsburgh, Pa.—Car, air and journal jacks. Represented by E. E. Thulin and D. F. Evans.

Durametallic Corporation, Kalamazoo, Mich.—Metallic products and packings, and wheel machining apparatus. Represented by J. M. Bandish, R. R. Smith and C. C. Hall.

The Edna Brass Manufacturing Company, Cincinnati, Ohio.—Mechanical lubricators, air-operated cylinder cocks, water columns, oil burners, gage cocks, coal sprinklers, automatic air-pump oilers and rigid water gages. Represented by E. O. Corey and F. S. Wilcoxen.

The Faessler Manufacturing Company, Moberly, Mo.—Roller expanders. Represented by G. R. Maupin.

Firth-Sterling Steel Company, Chicago.—Cutting tools and high-speed steel. Represented by E. T. Jackman and C. E. Hughes.

J. B. Ford Company, Wyandotte, Mich.—Alkaline cleaning compounds. Represented by C. S. Tompkins.

Forster Paint & Manufacturing Co., Winona, Minn.—Printed matter. Represented by H. J. Caswell.

Foster-Johnson Reamer Company, Elkhart, Ind.—Hand expansion reamers, line expansion reamers and special tools for repairing railroad equipment. Represented by L. G. Groessl, C. B. Whitmyer and F. M. Enos.

Gibbs Grease Cellar Plate Company, Chicago.—Grease cellar plate. Represented by W. L. Gibbs.

Gilg, Henry F., Pittsburgh, Pa.—Valve for wash-out and fill-up and rigid and flexible stays. Represented by H. F. Gilg.

Goddard & Goddard Company, Detroit, Mich.—Milling cutters and reamers. Represented by C. S. Goddard, C. H. Wallace and S. H. Grattan.

Gold Car Heating & Lighting Company, Brooklyn, N. Y.—Pressure regulator, steam-hose coupler, valves and fin tubing. Represented by F. W. Dearborn, R. L. Belknap and A. D. Stuver.

Graham-White Sander Corporation, Roanoke, Va.—Sander and sand spreader. Represented by W. H. White and W. L. Ranson.

Grip Nut Company, Chicago.—Grip nut products. Represented by L. W. Kass, W. E. Sharp and E. H. Wood.

Hunt-Spiller Manufacturing Corporation, Boston, Mass.—Cylinder and piston-valve bushings, piston bull ring, piston valve, piston valve packing, cylinder packing and sectional cylinder rings, crosshead shoes, and floating rod bushings. Represented by V. W. Ellet, E. J. Fuller, F. W. Lampton and D. F. Hall.

Huron Manufacturing Company, Detroit, Mich.—Washout and arch-tube plugs. Represented by H. N. Requalds, E. H. Willard and W. H. Bentley.

Independent Pneumatic Tool Company, Chicago.—Pneumatic tools. Represented by J. T. Cruice.

The Joyce-Cridland Company, Dayton, Ohio.—Locomotive and car jacks and air-jack hoists. Represented by C. H. Brown and C. L. Bunnell.

O. D. Kinsey, Harvey, Ill.—Triple-valve-cylinder truing tool, metallic piston and valve-stem boring tool for roundhouse operation and locomotive frame jaw and rod grinder. Represented by O. D. Kinsey.

The Lehon Company, Chicago.—Locomotive cab-curtain canvas treated to resist engine gases. Represented by J. E. Eipper, H. A. Wolfe and J. W. Shoop.

Locomotive Firebox Company, Chicago.—Nicholson thermic syphon. Represented by C. A. Seley, A. M. Wheeler, Robert Carr and L. R. Pyle.

Charles R. Long, Jr., Company, Louisville, Ky.—Paint, varnish and lacquers. Represented by M. H. Oakes, J. S. Lemley and J. C. Weedon.

MacLean-Fogg Lock Nut Company, Chicago.—Lock nuts. Represented by J. W. Fogg and J. A. MacLean.

Mall Tool Company, Chicago.—Electrical flexible shaft grinding and polishing machines. Represented by T. N. Gallagher.

Manning, Maxwell & Moore, Inc., Chicago.—Triple-valve bushing grinders, distributing- and feed-valve bushing grinders, feed-valve piston expanders and frame jaw grinders. Represented by R. S. Dean, F. W. Blake and A. J. Cote.

W. H. Miner, Inc., Chicago.—Friction draft gears, roller side bearings and safety hand brakes. Represented by B. S. Johnson, Henry Miner, Harry Schwartzenberg, Edward Lehman and Harold Brooks.

Monarch Packing & Supply Co., Chicago.—Mechanical packings. Represented by Stanley MacDole and C. C. Humberstone.

Morton Manufacturing Company, Muskegon Heights, Mich.—Photos of draw-cut shapers and key seaters. Represented by G. F. Goble.

Nathan Manufacturing Company, New York City.—Mechanical lubricators, water columns, low water alarms, atomizers and globe and angle valves. Represented by Richard Welsh, Fred Ehredt and J. A. Kelly.

National Malleable & Steel Castings Co., Cleveland, Ohio.—Friction draft gears, rotary couplers, radial butt couplers, flangeless body center plates, engine coupler pockets, wrecking hooks, steam-shovel chain, journal boxes and lids and yokes. Represented by F. E. Moffett, T. W. Aishton and J. F. Hutson.

National Tube Company, Pittsburgh, Pa.—Steel pipes, seamless-steel boiler tubes, superheater tubes, seamless-steel pipe; also physical test on pipe and boiler tubes. Represented by P. J. Conrath, J. W. Kelly and J. M. Denney.

Oakite Products, Inc., New York City.—Vapor system and locomotive air-pump cleaning materials. Represented by G. M. Seib, A. W. Perry, C. E. Barber, A. H. Green, D. E. Williard, C. A. Peterson and R. E. Wright.

The Ohio Injector Company, Chicago.—Injectors, starting valves, lubricators, automatic flange oiler, container and auxiliary oil bowl, transfer lubricator filler, boiler check, water-glass protector, fire jet and low-water alarm. Represented by A. C. Beckwith and C. G. Sauerberg.

The Okadee Company, Chicago.—Automatic cylinder cock, blow-off muffler, locomotive front-end hinge, atomizing lubricator, water-glass protector, blow-off valve, tender hose coupler and drain valves. Represented by A. G. Hollingshead, C. G. Learned, C. W. Ploen, W. H. Heckman, M. J. Monroe, G. P. Dirth and G. E. Johnson.

Oxweld Railroad Service Company, Chicago.—Welding and cutting equipment, light reflectors,

carbide lamps, chromium-plated pins and bushings. Represented by G. M. Crownover, William Leighton, W. A. Hogan, E. L. Williams and T. E. Hilton.

Paxton-Mitchell Company, Omaha, Neb.—Metallic packing and small machine. Represented by J. J. Keliher, T. J. McConnell and H. J. Molloy.

The Pilliod Company, New York.—Locomotive valve gear. Represented by W. H. Bellmaine, Frank Fisher and Harry Snyder.

Pilot Packing Company, Chicago.—Packings. Represented by Joseph Sinkler and Robert Sinkler.

Pratt & Whitney Co., Chicago.—Taps and reamers. Represented by W. R. Mullinix and D. S. Woods.

The Pyle-National Company, Chicago.—Duplex distribution valve, flood lights, turbo-generators, headlight cases, vaporproof fittings, safety switches, plugs and receptacles, locomotive fittings and fixtures, and safety hand lamps. Represented by J. W. Johnson, William Miller, J. A. Amos, Walter Smith, Walter Jansen, R. R. Bush, William East, William Ross and J. V. Baker.

Reliance Machine & Stamping Works, Inc., New Orleans, La.—High-pressure grease appliances. Represented by E. B. Norman and G. A. Pettit.

Simmons-Boardman Publishing Company, New York.—Copies of Railway Mechanical Engineer, Railway Age and Airway Age. Represented by J. M. Rutherford, E. L. Woodward, H. C. Wilcox, D. A. Steel, H. A. Morrison, H. E. McCandless and R. E. Beauchamp.

Simonds Saw & Steel Co., Chicago.—Saws, knives, files, abrasive grinding wheels and cutter heads. Represented by P. S. Larson and H. P. Baumann.

Standard Auto-Tite Joints Company, Pittsburgh, Pa.—Metallic steam heat connections, steam and air connection between locomotive and tender, flexible ball joints for blower, washout, reservoir connection, booster connection and chromium plated products. Represented by A. M. Frauenheim and E. H. Mattingley.

Standard Stoker Company, Inc., Chicago.—Stokers, working model of slope-sheet coal pusher.

Sterns Stafford Roller Bearing Company, Lawton, Mich.—Roller bearings. Represented by J. M. Jordan.

Swanson Company, Chicago.—Locomotive gage holders. Represented by O. W. Swanson.

T-Z Railway Equipment Company, Inc., Chicago.—Boiler washout and arch tube plugs, automatic drain valves, front-end blower and smoke-preventer nozzles, blow-off valves, tender hose couplers, piston rods, valve-stem packing, cylinder cocks and drifting valves. Represented by G. S. Turner, F. J. Kearney and F. G. Zimmerman.

Union Asbestos & Rubber Company, Chicago.—Asbestos materials. Represented by O. J. Rudolph.

Viloco Railway Equipment Company, Chicago.—Sanders, vacuum bell ringer, pneumatic whistle operator, rail washer, grease lubricator for piston rods, locomotive exhaust pipe and uncoupling-lever attachment. Represented by A. G. Hollingshead, W. H. Heckman, C. W. Ploen, G. E. Johnson, J. M. Monroe, G. P. Dirth and C. G. Learned.

Westinghouse Air Brake Company, Chicago.—Brake-cylinder protectors, super governor, variable release valve and Pneuphonic horns. Represented by J. R. Holton, P. E. Yencey and L. M. Carlton.

Whiting Corporation, Harvey, Ill.—Locomotive mover and coal stoker. Represented by H. K. Christie and Jeff Corydon.

* * *

On the Pennsylvania

Traffic

The National Freight Company, recently organized Pennroad Corporation subsidiary has acquired the Judson Freight Forwarding Company, well-known Chicago concern which has been in the freight forwarding business for nearly 40 years, and which has offices in 26 cities.

The following shippers' advisory boards will meet during October. Mid-West Shippers' Advisory Board on October 3 at Des Moines, Ia.; Atlantic States Shippers' Advisory Board on October 3 at Utica, N. Y.; Ohio Valley Shippers' Advisory Board on October 3 at Indianapolis, Ind.; Great Lakes Regional Advisory Board on October 9 at Buffalo, N. Y., and the Northwest Shippers' Advisory Board on October 29 at Duluth, Minn.

The Pennsylvania has applied to the Interstate Commerce Commission for fourth section relief in connection with the establishment of extra fares on its train No. 5 from New York to Chicago. The commission has set for hearing earlier applications filed by various eastern roads in connection with their extra fares and it is expected that it will result in a somewhat general investigation of the subject.

The Great Northern has established a train between Spokane, Wash, and Seattle, which enables passengers to view the Cascade Tunnel and mountains within the daylight hours. The train, which carries a cafe-parlor-observation car, leaves Spokane at 7:30 a. m. and arrives in Seattle, 340 miles, at 7 p. m. It reaches the tunnel at 2:50 p. m. Returning it leaves Seattle at 9 a. m., passes through the tunnel at 1:05 p. m. and arrives in Spokane at 8:30 p. m.

The St. Louis-San Francisco, beginning October 20, will run an exhibit car containing 700 exhibits of resort features, forest products, floriculture, preserved fruits and vegetables and horticultural and agricultural products, from Pensacola, Fla., to 34 towns and cities in the middle west. The construction of this car has recently been completed in the Frisco's shops at Springfield, Mo. It has 400 square feet of display space with seating capacity for 80 people.

Senator Blease, of South Carolina, has introduced in Congress a bill, S 1707, to amend section 15 of the interstate commerce act by adding a proviso as follows: "Provided, That the right given in this section, as well as in any other section of the interstate commerce act, to prescribe minimum rates shall not be construed to prevent carriers, when they can do so without violation of any other section of the act, from making rates competitive between the shippers served by such carriers and the shippers in other sections competing therewith; the minimum-rate provision having no other force and effect than the prevention of violations of the interstate commerce act."

The Interstate Commerce Commission has denied a petition filed by the Western Maryland for the re-opening of the proceeding in which the Canton Railroad is seeking increased divisions. The Western Maryland desires to present newly discovered evidence, having been informed that control of the Canton Railroad had been acquired by the Pennsylvania. The Canton filed an answer stating its understanding that the stock of the Canton Company, which controls the Canton Railroad, had been acquired by the Pennroad Corporation.

Demurrage Collections Reduced One-Third

The total amount collected in the shape of demurrage on freight cars by the railroads of the country in the year 1925, was $20,391,640, according to a statement published in "The Security Owner." This is a reduction of about 33 per cent from the total of $30,505,039 collected in 1920. This notable reduction, within a period of five years, is credited in large measure to the good effect of the activities of the Shippers' Regional Advisory Boards.

Pacific Northwest Shippers' Board

At a meeting of the Pacific Northwest Advisory Board at Seattle, Wash. on September 10, car requirements for the last quarter of 1929 for Washington, Oregon and Idaho were estimated as 368,149 cars or 6,077 cars less than for the corresponding period of 1928. The difference is due to an expected decrease in the shipments of wheat and fruit, the only major commodities expected to require fewer cars. The pulp and paper industry expects to need 1,124 cars more than in the last quarter of last year. Fred W. Sargent, president of the Chicago & North Western, was the principal speaker at the meeting.

Better Time to Mexico

The Missouri Pacific, through co-operation with the National Railways of Mexico and the customs and immigration officers of the United States and Mexico has reduced the schedule of southbound passenger service to Mexico City approximately one hour and the north bound schedule 12 hours. The new time is made possible by changing the schedule of the Sunshine Special and by having customs inspections made on the trains. This train, which carries sleeping cars for Mexico City, now leaves St. Louis, Mo. at 6:30 instead of 6:45 p.m. and Memphis, Tenn., at 11:10 p. m. instead of 11:30 p. m. thereby affording corresponding carrier arrival at Laredo, Tex., and better

connection with the National Railways of Mexico. Southbound customs and immigration inspections are conducted at a convenient evening hour while the train is enroute from San Antonio to Laredo, while northbound they are completed before the train reaches the border. Under this arrangement delays at the border are eliminated.

Fast Freight Summer and Winter

The Pennsylvania announces that the custom, heretofore generally in vogue, of lengthening through freight train schedules, between the Atlantic seaboard and the western cities, to the extent of one hour, in winter, because of the probable more numerous delays on account of unfavorable weather, has been abandoned; that is to say, the fast schedules now in effect will be continued throughout the year. Westbound merchandise is delivered at Chicago and St. Louis on the third morning, and on perishable freight similar schedules are maintained eastbound. The schedules to principal intermediate cities will likewise be kept unchanged.

Railroads Completing N. Y. Study on Carload Freight Delivery

Working through the Subcommittee of the Presidents' Conference Committee, the railroads entering New York City are developing as rapidly as possible an optional collection and delivery service plan to apply to carload non-perishable merchandise freight.

Various organizations representing merchants of the New York district have also interested themselves in the question of direct collection and delivery service, and are co-operating with the railroads in working out some such plan as a substitute for constructive station and constructive lighterage operations which, in accordance with the recent decision of the Interstate Commerce Commission, were terminated by the railroads effective September 25.

Trans-Missouri-Kansas Shippers' Board

Industry and agriculture in the States of Missouri, Kansas, Oklahoma, Arkansas and Illinois expect an increased volume of traffic during the months of October, November and December of this year compared with the same months of 1928, according to reports at the meeting of the Trans-Missouri-Kansas Shippers' Board at St. Louis, Mo. on September 18. Of the 28 basic commodities produced in this region, 14 increases over last year were predicted. The total volume of freight expected during the next quarter, was estimated as 507,267 cars, compared with 490,742 shipped during the same period last year, an increase of 3.4 per cent.

The Traffic Club of St. Louis served members and visitors of the Board with a luncheon in the Ivory Room of the Jefferson Hotel at which Governor Reed spoke on "The Importance of Co-Operation between the Railroads and the Public." The luncheon was attended by 1,000 representatives of the railroads and the shipping public. Dr. W. F. Gephart, of St. Louis, addressed the conference on "Bankers Relation to Transportation". Col. F. W. Green, vice-president of the St. Louis-Southwestern presented aeroplane views showing grade and curve reduction work on that line, explaining the improvement in service that the Cotton Belt is able to render the public through expenditures and operating economies effected. The progress of the steel industry was explained by R. K. Keas of St. Louis. The improved methods employed by the manufacturers of steel today, were displayed by film, and reflected the improvements that have been made during the past several years by that industry.

Record Freight Traffic

Class I railroads handled the greatest volume of freight in the first seven months this year ever offered to them in any corresponding period, according to reports compiled by the Bureau of Railway Economics. The total was 280,439,978,000 net ton-miles, an increase of 8,066,690,000 net ton-miles, or 3 per cent, over the previous high record for any corresponding period, established in the first seven months of 1927. It also was an increase of 17,296,229,000 net ton-miles, or 6.6 per cent, above the total for the same period in 1928.

The railroads in the Eastern district for the seven months reported an increase of 8.6 per cent, compared with the same period in 1928, while the Southern District reported an increase of 1.2 per cent. The Western district reported an increase of 5.8 per cent.

Freight traffic in July amounted to 41,991,315,000 net ton-miles, an increase of 2,838,387,000 net ton-miles, or 7.2 per cent, over that of the same month last year. It also was an increase of 3,622,054,000 net ton-miles, or 9.4 per cent, above that for July, 1927. In the Eastern district, there was an increase of 8.3 per cent in July, 1929, compared with the some month in 1928, while the Southern district reported a reduction of 1.4 per cent. The Western district reported an increase of 8.7 per cent.

The average speed of freight trains in July this year, according to reports filed by the Class I railroads, was 13.4 miles per hour, the highest average ever reached in any July on record and an increase of three-tenths of one mile above that for July last year. This average, however, was the same as that for June this year.

The daily average movement per freight car in July was 32.1 miles, which exceeds the previous high average for any July on record, having been 1.8 miles greater than that for July, 1928, and three miles greater than that for July, 1927.

The average load per car in July this year was 27.3 tons, including less than carload freight as well as carload freight. This was an increase of seven-tenths of a ton above that for July, 1928, and three-tenths of a ton above that for July, 1927.

Equipment and Supplies

Locomotives

THE INTERNATIONAL RAILWAYS OF CENTRAL AMERICA expect to be in the market shortly for five locomotives.

THE CHARLES R. MCCORMICK LUMBER COMPANY, San Francisco, Cal., has ordered one 2-8-2 type locomotive from the Baldwin Locomotive Works.

THE NEW YORK CENTRAL has purchased 42 electric locomotives for freight service in connection with the west side development in New York City. These locomotives will be furnished by the American Locomotive Company and will contain General Electric Company's electrical equipment. The cost is in excess of $5,000,000. Inquiry for these locomotives was reported in the *Railway Age* of June 8.

Freight Cars

THE INTERNATIONAL RAILWAYS OF CENTRAL AMERICA expect to be in the market shortly for 75 stock cars, 50 box cars and 50 flat cars.

THE UNITED FRUIT COMPANY is inquiring for 75 fruit cars of 15 tons' capacity for service on the Truxillo Railway, Honduras.

THE BOSTON & MAINE has ordered 1000 box cars of 40 tons' capacity and 500 hopper cars of 70 tons' capacity from the Standard Steel Car Company. In the *Railway Age* of August 3, this company was reported as having under consideration the purchase of the 1000 box cars.

Passenger Cars

THE INTERNATIONAL RAILWAYS OF CENTRAL AMERICA expect to be in the market shortly for seven first-class coaches, 15 second-class coaches and three baggage cars.

THE ERIE has ordered four gas-electric rail motor cars from the Standard Steel Car Company. These cars are to have Westinghouse electrical equipment. Inquiry for this equipment was reported in the *Railway Age* of March 23.

Machinery and Tools

THE ELGIN, JOLIET & EASTERN is inquiring for a 20-in. back-geared upright drill.

Iron and Steel

THE CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS is inquiring for 1,000 tons of structural steel for grade crossing elimination work in Ohio.

THE CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC has ordered 40,000 tons of rail from the Illinois Steel Company and 10,000 tons from the Inland Steel Company.

THE NEW YORK CENTRAL has ordered 1235 tons of steel for a loop track at its Grand Central Terminal from the McClintic-Marshall Company. A contract has also been given to the McClintic-Marshall Company for 175 tons for a bridge at Weehawken, N. J.

New York Central Inquiring for 200,000 Tons of Rail for 1930 Requirements

New York Central will receive bids until 12 o'clock noon, October 9 for its requirements for 1930, of open hearth steel rail and splice bars for the New York Central Lines. This calls for about 200,000 tons. Bids will be received by W. C. Bower, manager of purchases and stores, 466 Lexington avenue, New York City.

Inquiries for 310,000 Tons of Rail for Pennsylvania Requirements in 1930

Purchases of new steel rail by the Pennsylvania for use during 1930 will total 310,000 tons, one of the largest steel rail orders in history. This new rail, together with fastenings, will cost approximately $21,000,000. The Pennsylvania's rail orders last year, this year and in 1930 will aggregate almost 900,000 tons, representing the greatest consecutive yearly purchases of new steel rail it has ever made.

It has been the policy of the Pennsylvania to lay heavy section easy-riding rail, weighing 130 lb. to the yard in its main line tracks. The new rail to be purchased will be used for renewals and improvements in main tracks and for further extension of the heavier rail installations to other lines of the railroad. Some of the new rail will also be utilized in the continuance of double tracking work and new track construction at various points.

In the ten years ending 1929 the rail purchases by the Pennsylvania System for replacing and improving its track total 1,877,500 tons. In the last five years the average has been about 230,000 tons. In this period the company has spent for rail approximately $53,000,000.

Signaling

THE AMERICAN LOCOMOTIVE COMPANY has ordered from the General Railway Signal Company, 50 sets of locomotive apparatus for automatic train control, to be used on engines being built at Schenectady for the New York Central.

THE NEW YORK CENTRAL has ordered from the General Railway Signal Company dispatcher-type control machines to be installed in existing interlocking towers at Dunkirk, Ohio, and Centerburg, Ohio; at Dunkirk, a machine with three working levers for one outlying switch and accompanying signals, and at Centerburg, five working levers for two switches and six signals.

Supply Trade

The **Barco Manufacturing Company,** Chicago, is constructing a three-story addition, 50 ft. by 225 ft., to its plant in Chicago.

E. T. Wade has been appointed representative of the **Davis Brake Beam Company,** Johnstown, Pa. for the South Atlantic states. Mr. Wade's office is at 1222 Mutual building, Richmond, Va.

J. H. Watters, formerly vice-president of the New York Air Brake Company has been elected president of the **Marion Steam Shovel Company,** Marion, Ohio, to succeed **J. L. Ackerson,** resigned.

Joseph W. Eshelman has been appointed representative of the **Pennsylvania Pump & Compressor Company** with headquarters in the American Traders Bank building, Birmingham, Ala.

The **Bucyrus-Erie Company,** South Milwaukee, Wis. has acquired Ruston & Hornsby, Ltd., Lincoln, England and Ruston-Bucyrus, Ltd. is being formed to represent the Bucyrus-Erie Company in England.

C. Mosier, secretary and treasurer of the **Union Asbestos & Rubber Company,** Cicero, Ill., has been elected vice-president and general manager with headquarters at Chicago and has been succeeded by **L. J. Silverman** who will also act as general counsel.

The Linde Air Products Company, New York, has opened a new oxygen plant at 1628 Cascade street, Erie, Pa. **J. J. McKeen** is superintendent of the plant and **R. S. Hamilton,** with headquarters at East Buffalo, N. Y., is district superintendent.

W. H. Cadwallader, acting vice-president of the **Union Switch & Signal Company,** Swissvale, Pa. has been elected vice-president. **M. L. Gray,** assistant to vice-president has been appointed acting vice-president. **H. S. Loomis,** commercial engineer has been promoted to assistant to the general manager.

F. H. McGraw & Company has been organized by **Frank H. McGraw, James C. Boyd, Harry A. Brinkerhoff, George Burgess** and **Hamilton E. Smith,** with headquarters at 51 East Forty-second street, New York. The company will engage in a general contracting and engineering business. **Frank H. McGraw** is president.

The Cleveland Tool & Supply Company, Cleveland, Ohio, now represents **H. D. Conkey & Company,** Mendota, Ill., for the sale of their overhead traveling crane equipment in the Cleveland district. H. P. Conkey & Company are building an addition to their plant at Mendota, which will about double its present capacity.

James G. Pattillo, Jr., representative of the **Wagner Electric Corporation** with headquarters at Pittsburgh, Pa., has been promoted to manager of the Pittsburgh branch sales office. **Alfred B. Emrick** has been transferred from the Pittsburgh office to the Dallas, Texas, office as branch sales manager.

The entire foreign business of the **Johns-Manville Corporation,** New York has been taken over by the **Johns-Manville International Corporation** for the purpose of more efficiently developing that business throughout the world. The board of directors of the new corporation are as follows: **Lewis H. Brown,** chairman, **W. R. Seigle, E. M. Voorhees, P. A. Andrews, J. S. Adams, E. S. Crosby** and **C. L. Sager;** the officers are: **W. R. Seigle,** president, **P. A. Andrews,** vice-president in charge of sales, **J. S. Adams,** vice-president in charge of sales promotion, **J. S. Crawford,** treasurer, **C. L. Sager,** secretary, **J. L. Pichetto,** assistant treasurer.

A special meeting of the stockholders of the **Yale & Towne Manufacturing Company,** Stamford, Conn., is to be held on October 10, to take action on the acquisition of H. & T. Vaughan, Ltd., Willenhall, England. A provisional contract, subject to the approval of the Yale & Towne stockholders, has been entered into for the purchase of this British concern which has been in existence since 1850, and is now the largest producer of locks in the British Empire. H. & T. Vaughan, Ltd. are the owners of important trade marks, which the company will acquire, and, in addition, it is the intention to manufacture Yale locks in England for distribution throughout the British Empire. It is planned also to operate the business as the British Branch of the Yale & Towne Manufacturing Company; H. & T. Vaughan Ltd., going into liquidation. The purchase price has been fixed at £300,000 or $1.455,000 and stockholders of H. & T. Vaughan, Ltd., have agreed that the purchase price is to be paid in stock of the Yale company. The purchase is dependent upon the acquiescence of the stockholders at the meeting of October 10.

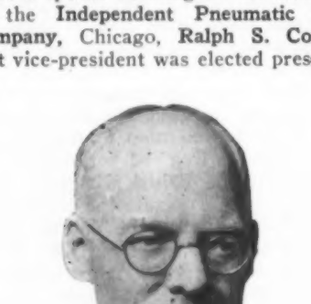
L. R. Gurley, associate editor of the *Railway Age* and the Railway Mechanical Engineer, has resigned to become editor of Welding, a new magazine to be published by the Steel Publications, Inc., Pittsburgh, Pa. Mr. Gurley is a graduate of the Altoona, Pa., high school. He entered the University of Pittsburgh in 1916, and after completing a four-year course in railway mechanical engi-

neering he became a special apprentice at the Altoona shops of the Pennsylvania. He completed this three-year apprenticeship course in the spring of 1923, graduating as a motive power inspector and being placed in the office of F. E. Grimshaw, superintendent of motive power, at Pittsburgh. He continued in this capacity until he joined the editorial staff of the *Railway Age* and the Railway Mechanical Engineer on May 6, 1924. Mr. Gurley has been an active member of the American Welding Society for the past five years and is at the present time a member of

L. R. Gurley

the Revision of By-Laws Committee of the National Meetings and Paper Committee and second vice-chairman of the New York Section of the society. He is also an associate member of the American Society of Mechanical Engineers and a member of the New York Railroad Club.

At a special meeting of the directors of the **Independent Pneumatic Tool Company,** Chicago, **Ralph S. Cooper,** first vice-president was elected president



Ralph S. Cooper

to succeed John D. Hurley who died on August 15. **Neil C. Hurley** was elected a member of the executive committee and **Raymond J. Hurley** was elected a director. Mr. Cooper graduated from Cornell University in 1903 with a degree in mechanical engineering and immediately entered the employ of the Independent Pneumatic Tool Company. After a year in the shop he became associated with the sales department and shortly after was promoted to manager of the New York office and then to eastern manager. In 1917, he was elected vice-president in charge of eastern sales and was transferred to Chicago in 1918 as vice-president and general sales manager. He spent 1920 and 1921 in Europe, opening the company's office in Great Britain and establishing Thor agencies throughout the Continent. On his return to the United States in 1921, he also became general manager in charge of all departments of the company, which work he has carried on for the last eight years.

Obituary

J. H. Cooper, western manager of the Pilliod Company with headquarters at Chicago, died in that city on September 8.

Trade Publication

HIGHWAY CROSSING SIGNAL.—International Equipments, 20 Pine street, New York City, and Dominion International Equipments, 3081 Ontario street, East Montreal, Canada, have issued a 15-page pamphlet, illustrated, describing their "lightning flash" crossing signal, the installation of which at a number of crossings on the Michigan Central was noticed in the *Railway Age* of August 10, page 393. A picture of this signal as installed at Hull, Ont., was shown in the *Railway Age* of May 4, page 1066. Attention is called to the fact that neon tubes give advance warning of the end of their life, by the fading of the color, thus giving ample notice of the need or renewal. The tubes which are used have shown an average life of more than 5000 illumination hours.

Construction

ATCHISON, TOPEKA & SANTA FE.—A contract for the construction of the new hospital building of the Hospital Association of this railroad at Topeka, Kan., has been let to the George Senna Construction Company, Topeka. The building will be five stories in height and will contain 85 rooms. It was reported in the *Railway Age* of August 17 that bids were being received for this work.

CANADIAN NATIONAL.—Company forces have begun the construction of the substructure of a new eleven span deck plate girder bridge over the Canoe river near Canoe River, B. C. It is expected that bids for the construction of the superstructure of the bridge, which will replace a Howe truss span and timber trestle approaches, will be received early in 1930. A contract has been awarded to the Britnall Contracting Company, Toronto, Ont., for the construction of a one-story brick and concrete warehouse at North Bay, Ont., which will have outside dimensions of 50 ft. by 410 ft.

CANADIAN PACIFIC.—A contract for the construction of a continuous type truss bridge over the Salmon river near Keefers, B. C., to replace a steel arch bridge at the same point has been let to the Hamilton Bridge Company, Hamilton, Ont. This bridge is being constructed immediately alongside of the old bridge and 12 ft. higher. The contract for the construction of the substructure has been awarded to the Sidney E. Junkins Company, Vancouver, B. C., while the contract for the grading and construction of approaches has been let to the General Construction Company, Vancouver.

CHESAPEAKE & OHIO.—This company has applied to the Interstate Commerce Commission for a certificate authorizing the construction of an extension of its Gauley and Rich Creek subdivision from Marshall, W. Va., up Rich Creek into the coal lands of the Gauley Mountain Coal Company, approximately 5.4 miles. The Levisa River, a subsidiary of the C. & O., has applied for authority to construct a line from a connection with the C. & O. at or near Millard, Ky., up Levisa Fork of the Big Sandy river to the Kentucky-Virginia state boundary line, approximately 28 miles.

CHICAGO & NORTH WESTERN.—A contract for the construction of a cinder handling plant at Winona, Minn., has been awarded to the Railroad Water & Coal Handling Company, Chicago.

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC.—This company has been authorized by the Interstate Commerce Commission to construct a connection between the Milwaukee and the Cowlitz, Chehalis & Cascade in Lewis county, Wash., a distance of approximately one mile.

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC.—A contract has been let to Joseph E. Nelson & Sons Company, Chicago, for the construction of a pipe line at West Clinto, Ind.

CHICAGO, ROCK ISLAND & PACIFIC.—A contract for the construction of an addition to the roundhouse at Des Moines, Iowa, has been awarded to Arthur H. Neumann & Co., Des Moines, at a cost of about $60,000.

CHICAGO, ROCK ISLAND & PACIFIC-ST. LOUIS-SAN FRANCISCO.—These railways and municipal officers of Oklahoma City, Okla., have reached an agreement which provides for the revision of plans for the construction of a new passenger station south of the present Frisco right of way at Pine and Walker avenues. The revised plans will eliminate viaduct en-

trances to the proposed structure and substitute a ground level station.

CINCINNATI UNION TERMINAL.—A contract has been let to the Ohio Valley Constructors, Inc., Cincinnati, Ohio, for a portion of the bridge work involved in the construction of the new union terminal at Cincinnati.

ILLINOIS CENTRAL.—Authorization has been made for the construction of additional trackage in the North Jackson yard at Jackson, Miss., and the relocation of the yard office at a cost of about $75,000. A contract has been let to the Railroad Water & Coal Handling Company, Chicago, for the construction of a steel coaling station at Fulton, Ky., to replace a wooden structure destroyed by fire.

KANSAS CITY SOUTHERN.—A contract has been let to the List Construction Company, Kansas City, Mo., for the placing of 36,000 cu. yds. of earth embankment on four miles of main line just north of Beaumont, Tex., as part of the work of raising the track to a new elevation. This material will be hauled by train. The same contractor has been awarded a contract providing for the train-haul of 87,000 cu. yds. of earth for the construction of a new yard at Dowling, Tex., three miles south of Beaumont. The yard site will also require the excavation of about 26,000 additional cu. yds. The construction of buildings and other facilities at the proposed terminal at Dowling Yard and the laying of track will not be undertaken until 1930.

LONG ISLAND.—The Public Service Commission of New York has approved detailed plans submitted by this company for the elimination of the South Country road crossing at Islip, N. Y.

LONG ISLAND.—A contract has been awarded to Foley Brothers, Inc., of Pittsburgh, Pa., for the elimination of six grade crossings on this company's lines at Jamaica, N. Y., at a cost of $2,473,162. Structural steel and cement work retaining walls, water proofing, and viaduct work are included in the contract. The project includes the removal of crossings at Smith street, New York avenue, Puntine street, Canal street and Brenton avenue on the main line, at South street on the Montauk division, and of three highway bridges at Prospect, Washington, and Union Hall streets. The entire cost will be about $6,000,000, of which the railroad will pay 50 per cent, the state 49 per cent, and the city 1 per cent. Elevation of the structure will begin on the south side of the present right of way, and three temporary tracks will be operated during the construction period. Eight tracks will be available for use when the elimination program is completed. The work will be begun immediately, and will be finished in about two years.

MISSOURI PACIFIC-TERMINAL RAILROAD ASSOCIATION.—A contract for the construction of a one- and two-story brick commissary building on Scott avenue, St. Louis, Mo., for the use of these two railroads has been let to the Fruin-Colnon Contracting Company, St. Louis. The structure will have outside dimensions of 40 ft. by 24 ft. and 40 ft. by 60 ft. and will involve an expenditure of about $20,000.

NEW YORK CENTRAL.—This company plans the elimination of a grade crossing on state highway No. 24 at Centerburg, Ohio. The estimated cost of this structure will be about $126,000, of which the railroad will pay approximately 50 per cent.

NEW YORK CENTRAL.—Plans submitted for the elimination of a grade crossing on this company's lines at Main street, Cold Spring, N. Y., have been approved by the Public Service Commission of New York.

PENNSYLVANIA.—Plans have been prepared for the construction of a freight station and team track layout at Dayton, Ohio, which will involve an expenditure of more than $500,000. The freight station will have outside dimensions of 50 ft. by 500 ft. and will provide loading space for 30 cars. The team tracks will accommodate 65 cars while an additional yard will have a capacity of 85 cars. Other facilities to be constructed at the freight station include an automobile unloading platform and an electric crane

PENNSYLVANIA.—The most important of a number of contracts recently awarded by this company is the one let to Gibbs and Hill, Inc., of New York, for the erection of the catenary system between Millstone Junction and Sunnyside yard and Jersey City in connection with the electrification of the main line from New York to Philadelphia. The cost of this work, as indicated by the contract price, is $5,340,000. Next in importance is a contract for $780,000 awarded to the Stillman-Delehanty-Ferris Company, of Jersey City, for the construction of new transfer bridge foundations and racks and the reconstruction of the stock yards pier at Jersey City, N. J. Other contracts have been awarded as follows: To Philip Carey Company, Newark, for waterproofing a concrete deck bridge used jointly by the Pennsylvania and Lehigh Valley over Newark Bay at Newark, N. J., at a cost of approximately $30,000; to Bates & Rogers Construction Company, Chicago, for the construction of an undergrade bridge to eliminate a grade crossing at Morley, Mich., at a cost of $25,000; to the Crossan Construction Company, Brownsville, Pa., for building a new passenger station costing $25,000 at Coshocton, Ohio; and to the Bader Construction Company of Atlantic City for the construction of an overhead bridge to eliminate a grade crossing at Seaville, N. J., at a cost of approximately $23,000. Plans submitted by the Pennsylvania for the elimination of a grade crossing at Colby road, Sardinia, N. Y., have been approved by the Public Service Commission of New York.

SOUTHERN PACIFIC.—The Public Service Commission of Oregon has approved the construction of a highway subway under the tracks of this company immediately north of Summit, Benton county, Ore.

Financial

BALTIMORE & OHIO.—*Common Dividend Increased.*—Directors of this road, on September 18, voted to place the common stock on an annual dividend basis of seven dollars. The annual dividend had previously been six dollars.

BOSTON & MAINE.—*Stock.*—This company has applied to the Interstate Commerce Commission for authority to issue $7,500,000 of 7 per cent prior preference stock for exchange for convertible general mortgage bonds.

CHICAGO, INDIANAPOLIS & LOUISVILLE.—*Equipment Trust Certificates.*—This company has applied to the Interstate Commerce Commission for authority for an issue of $520,000 of 5 per cent equipment trust certificates, to be sold at 96.917 to the Harris Trust & Savings Bank, Chicago, and Potter & Co., New York, the highest bidders.

CHICAGO & NORTH WESTERN.—*Convertible Bonds.*—This company has applied to the Interstate Commerce Commission for authority to issue $72,335,000 of 20-year 4¼ per cent convertible bonds, convertible on or after July 1, 1930, and before July 1, 1940, into common stock at 105. The bonds will be offered for subscription to stockholders of record September 24 at par and interest in an amount equal to 40 per cent of the par value of stock held and Kuhn, Loeb & Co., have agreed to underwrite the issue for a compensation of 2½ per cent. The application also asked authority to issue from time to time $68,890,500 of common stock in conversion. The proceeds of the bonds are to be used to pay off outstanding bonds of the North Western and the Chicago, St. Paul, Minneapolis & Omaha and the application states that the result will be to reduce annual interest charges by $556,537.50.

CHICAGO & NORTH WESTERN.—*Equipment Trust Certificates.*—This company has been authorized by the Interstate Commerce Commission to assume obligation and liability in respect of $8,775,000 in equipment trust certificates to be issued by the United States Trust Company of New York, under agreements to be dated January 6, 1927 and September 1, 1929. The certificates are to be sold at not less than 94.297 per cent of par and accrued interest.

CLACKAMAS EASTERN.—*Articles of Incorporation Filed.* —Articles of incorporation have been filed in Oregon by the Clackamas Eastern Railroad Company which has been formed for the purpose of acquiring the Portland Southern, extending from Clackamas, Ore., up the Clackamas river 15 miles to a point near Carver. Officers of the railroad include Ben C. Dey, president; E. L. Hampton, secretary, and E. L. King, vice-president.

PENNSYLVANIA—*Bonds.*—The Interstate Commerce Commission has authorized the

Pittsburgh, Cincinnati, Chicago & St. Louis to issue $13,297,000 of general mortgage 4½ per cent bonds, to be delivered at par to the Pennsylvania in partial reimbursement for indebtedness to that company. The Pennsylvania also was authorized to guarantee the bonds.

WHEELING & LAKE ERIE.—*Cleveland Station Controversy Carried to Supreme Court.*—The Pittsburgh & West Virginia has filed in the Supreme Court of the United States a petition for a writ of certiorari for a review of the decision of the court of appeals for the sixth circuit which had reversed the decision of the federal district court granting an injunction to prevent the W. & L. E. from transferring its Ontario street passenger station in Cleveland, Ohio to the Cleveland Union Terminals Company and entering into an arrangement for the use of the facilities of the union terminal.

Average Prices of Stocks and of Bonds

	Sept. 24	Last week	Last year
Average price of 20 representative railway stocks.	155.39	158.07	122.23
Average price of 20 representative railway bonds..	89.55	89.54	93.65

Dividends Declared

Joliet & Chicago.—1¾ per cent, quarterly, payable October 7 to holders of record September 27.

Midland Valley.—Common, $1.25, payable October 15 to holders of record September 30.

Minneapolis, St. Paul & Sault Ste. Marie, Leased Lines.—2 per cent, payable October 1 to holders of record September 20.

Norfolk & Western.—Adjustment Preferred, $1, quarterly, payable November 19 to holders of record October 31.

Wheeling & Lake Erie.—Prior Lien, Accumulated dividend from May 1, 1918, to November 1, 1921, $24.50, payable October 1 to holders of record September 27 to September 30.

THE GREAT NORTHERN proposes to continue its radio advertising through the Fall and Winter and, beginning on September 30, has arranged to send out a series of half hour programs, to be broadcast from 26 stations of the National Broadcasting Company. The programs, made up mainly of fiction, will tell of the climatic and natural resources of the Northwest, together with the business and industrial advantages of that region.

* * *

On the B. & M. at Salem, Mass.

Railway Officers

Executive

Robert J. Bowman, who has been appointed vice-president of the Pere Marquette, with headquarters at Detroit, Mich., was born on April 15, 1891, at Fostoria Ohio. He entered railway service on February 7, 1907, with the New York, Chicago & St. Louis, serving as freight clerk at Mortimer, Ohio, until October, 1910. During this period he learned telegraphy. He was agent, operator and relief agent until December, 1914, when he entered the dispatcher's office at Ft. Wayne, Ind., later serving in the superintendent's office at the same point. From 1915 to 1918, Mr. Bowman was chief clerk to the superintendent at Ft. Wayne, and on the latter date he was transferred to the general office at Cleveland, Ohio. He was chief clerk to the superintendent of freight transportation until December, 1918, and chief clerk in the general superintendent's office until March, 1920. He then became chief clerk to the president, remaining in that capacity until January, 1927, when he left the New York, Chicago & St. Louis, with President Bernet, to go to the Erie in the same capacity. He was appointed assistant to the president of the Erie, with headquarters at New York in January, 1927, and in December, 1928, he was elected assistant vice-president, the position he held at the tme of his recent appointment.

Robert J. Bowman

Lynne L. White, who has been promoted to assistant to the president of the Erie, with headquarters at New York, has been connected with railway service for more than 25 years. He was born at Kenwood Park, Iowa, on July 2, 1889, and obtained his first railroad experience at the age of 15 years as a file clerk in the passenger department of the Chicago, Rock Island & Pacific at Cedar Rapids, Iowa. For several months during 1905 and 1906 he attended a business college, returning to the Rock Island in April of the latter year as a stenographer and clerk in the office of the division passenger agent at Cedar Rapids. From 1907 to 1918 Mr. White served as stenographer, clerk, timekeeper, secretary and chief clerk and chief dispatcher at various points on the Rock Island, including the offices of the superintendents of the Dakota division at Estherville, Iowa, and the Minnesota division at Cedar Rapids, the general superintendents of the Northern district at Cedar Rapids and the Central division at Davenport, Iowa, and the general manager of the First district at Des Moines, Iowa. He was also for a short time stenographer and trainmaster's clerk on the St. Louis-San Francisco at Enid, Okla. In February, 1918, he became chief clerk to the general superintendent of the Erie at Chicago and then served successively on that road as chief clerk to the general agent at Chicago, chief clerk to the general manager at Chicago and trainmaster at Hammond, Ind. In June, 1922, Mr. White was promoted to superintendent of the Chicago division, with headquarters at Hammond, where he remained until February, 1927, when his headquarters were removed to Chicago. In April, 1928, he was transferred to the Marion division at Huntington, Ind., and in June, 1929, he was promoted to assistant general manager of the Western district, with headquarters at Youngstown, Ohio. His further promotion to assistant to the president of the Erie became effective on September 16.

Lynne L. White

Financial, Legal and Accounting

J. E. Murphy, treasurer of the Chicago & Western Indiana and the Belt Railway of Chicago, with headquarters at Chicago, has also been elected assistant secretary.

Operating

A. H. Freygang, division engineer of maintenance of way of the Akron division of the Baltimore & Ohio, with headquarters at Akron, Ohio, has been appointed assistant superintendent of the Akron division, with headquarters at the same point.

H. E. Gilg, yardmaster on the Wheeling division of the Pennsylvania, has been appointed acting assistant trainmaster of the Akron division. **G. E. Middlesworth,** passenger conductor on the Pittsburgh division, has been appointed acting assistant trainmaster on the same division.

H. H. Sparling, chief train dispatcher of the Port Arthur division of the Canadian National at Port Arthur, Ont., has been promoted to superintendent of transportation of the Manitoba district, with headquarters at Winnipeg, Man., succeeding **M. Helston,** who has been appointed rule inspector and inspector of train dispatching offices for the Manitoba and Saskatchewan districts, with headquarters at Winnipeg.

Raymond C. Randall, who has been appointed superintendent of terminals of the Erie, with headquarters at Jersey City, N. J., was born at DeGraff, Ohio, on September 18, 1888. He was educated in the grammar and high schools and Business College, entering the service of the Erie on March 10, 1907, as yard clerk at Marion, Ohio. He was promoted to the position of assistant yardmaster at the same point in April, 1912, and in 1917, he became assistant

Raymond C. Randall

general yardmaster. The following year he was advanced to the position of general yardmaster at Marion. He was transferred in the same capacity to Hammond, Ind., in April, 1922. Mr. Randall became trainmaster of the Chicago division in November, 1926, and two years later he was appointed assistant superintendent at Chicago. In October, 1928, Mr. Randall was transferred to Jersey City as assistant superintendent of terminals, the position he held at the time of his recent promotion.

Traffic

F. M. Palmer, general agent of the freight department of the New York, Chicago & St. Louis, has been appointed industrial agent, with headquarters as before at Chicago.

A. A. Chilson, general agent of the New York, New Haven & Hartford at Springfield, Mass., has been appointed district freight and passenger agent, with headquarters at Springfield.

Henry R. Lensen has been appointed assistant general freight agent of the Michigan Central, with headquarters at Buffalo, N. Y., succeeding **S. W. Carder,** who has resigned to become general freight and passenger agent of the Rutland.

E. E. Wade, assistant to the passenger traffic manager of the Southern Pacific, with headquarters at San Francisco, Cal., has been granted a leave of absence pending retirement. Mr. Wade entered the service of the Southern Pacific in 1882 as a clerk in the general passenger department and in 1888 he was appointed chief clerk of the department. He became assistant general passenger agent in 1911 and was appointed assistant to the passenger traffic manager in May, 1927.

A. J. Cronin, assistant general freight agent of the Denver & Rio Grande Western, with headquarters at Salt Lake City, Utah, has been promoted to assistant traffic manager, with headquarters at the same point, and with jurisdiction over the Utah lines of the railroad. He succeeds **J. D. Stack,** who has been transferred to Los Angeles, Cal., where he replaces **E. S. Blair,** who retired on pension on September 10 and who held the title of general agent at Los Angeles.

J. M. Connell, general passenger agent of the Atchison, Topeka & Santa Fe, with headquarters at Topeka, Kan., has been promoted to assistant passenger traffic manager, with headquarters at the same point. **B. M. Bukey,** assistant general passenger agent, has been promoted to assistant passenger traffic manager, with headquarters as before at Chicago. **James B. Duffy,** general passenger agent, has been promoted to assistant passenger traffic manager of the Coast lines, with headquarters as before at Los Angeles. **E. J. Shakeshaft,** assistant general passenger agent at Topeka, has been promoted to general passenger agent, with headquarters at the same point. Each of the promotions becomes effective on October 1.

William D. McVey, who has been appointed assistant freight traffic manager of the New York Central, with headquarters at Chicago, has been in railway service for 31 years. He was born on October 23, 1881, at Perth, Ont., and after attending public and high schools in Detroit, Mich., he became an office boy in the general freight office of the Michigan Central in the latter city in 1898. He was advanced through various minor positions in the general freight office and in 1904 was advanced to rate clerk at Bay City, Mich. From 1907 to 1920 Mr. McVey served successively on the Michigan Central as soliciting freight agent at Bay City, assistant chief clerk to the general freight traffic manager at Chicago, commercial agent at Toledo, Ohio, and general agent at the same point. In 1920 he was promoted to assistant general freight agent at Buffalo, N. Y., where he remained until 1922 when he was transferred to Detroit. He was ap-

William D. McVey

pointed general freight and passenger agent of the Rutland, with headquarters at Rutland, Vt., in 1924, his appointment as assistant freight traffic manager of the New York Central becoming effective on September 16.

Engineering, Maintenance of Way and Signaling

H. H. Harsh, division engineer of the Pittsburgh division of the Baltimore & Ohio, with headquarters at Pittsburgh, Pa., has been appointed division engineer of the Akron division, with headquarters at Akron, Ohio. **G. B. Farlow,** division engineer of the Monongah division, with headquarters at Grafton, W. Va., has been transferred to the Pittsburgh division to succeed Mr. Harsh. **John Edwards,** assistant engineer of maintenance of way and structures at Pittsburgh, has been appointed division engineer of the Monongah division, replacing Mr. Farlow. **H. N. Anderson,** assistant division engineer of the Pittsburgh division with headquarters at Pittsburgh, has been promoted to assistant engineer of maintenance of way at Pittsburgh, succeeding Mr. Edwards. **J. G. Collinson,** supervisor of road at Meyersdale, Pa., has been promoted to assistant division engineer of the Pittsburgh division to succeed Mr. Anderson.

Mechanical

R. W. Bell, general superintendent of motive power of the Illinois Central, with headquarters at Chicago, has re-

signed, effective September 30, to engage in other business.

M. O. Gayned, trainmaster on the Arkansas Louisiana division of the Chicago, Rock Island & Pacific at Little Rock, Ark., has been promoted to assistant superintendent of that division, with headquarters at Eldorado, Ark.

W. C. Stephenson, general foreman of the Atlantic Coast Line, with headquarters at Tampa, Fla., has been appointed shop superintendent, with the same headquarters. **E. W. O'Brien** will succeed Mr. Stephenson as general foreman at Tampa.

Luke J. Gallagher, assistant master mechanic of the Fargo division of the Northern Pacific, with headquarters at Staples, Minn., has been promoted to master mechanic of that division, with headquarters at Dilworth, Minn., succeeding **Charles Emerson,** who has been transferred to the Tacoma division, with headquarters at Tacoma, Wash., as acting master mechanic. Mr. Emerson replaces **James Bruce,** who was granted a leave of absence on September 15 because of ill health. **Norbert E. Entrikin** has been appointed assistant master mechanic of the Fargo division to succeed Mr. Gallagher.

Obituary

C. R. Colgrove, assistant trainmaster on the Buffalo division of the Pennsylvania, died on August 26.

J. Kiley, general inspector maintenance of way of the Lehigh Valley, died yesterday after an extended illness.

Otto Wolfe, trainmaster of the Kentucky & Indiana Terminal, with headquarters at Louisville, Ky., died at the Deaconess Hospital, in that city, on September 17, at the age of 38 years.

W. B. Bevill, retired passenger traffic manager of the Norfolk & Western, died at his home in Roanoke, Va., on September 14. Mr. Bevill retired from the service of the company in 1926, after having served with that road for more than 43 years.

William E. Green, formerly an executive officer of more than ten different railroads in the West, died at Fulton, Ill., on September 24, following an extended illness. During his 54 years of railway service he had been first vice-president of the St. Louis Southwestern, president of the Denver, Laramie & Northwestern (now abandoned) and the Colorado, Wyoming & Eastern (now part of the Laramie, North Park & Western), and assistant general manager of the Denver & Rio Grande Western, in addition to serving in the operating departments of various other railroads.

Percy Hewett, superintendent of telegraph of the Southern Pacific lines in Texas and Louisiana, with headquarters at Houston, Tex., died at New Orleans, La., on September 15, while enroute to a meeting of the Telegraph and Telephone Section, Division I-Operating, of the American Railway Association at St. Paul, Minn. Mr. Hewett was born at Chicago on April 11, 1869, and after attending several army post schools and the Sacred Heart Institute in Indian Territory, entered railway service in 1887 as a telegraph operator on the Texas & Pacific. Later he became an operator on the Texas & New Orleans and in 1903 he was promoted to superintendent of telegraph of that railroad, with headquarters at Houston. He has served the Texas & New Orleans and the Southern Pacific, of which the former is now a part, continuously as superintendent of telegraph since 1903.

J. B. Scott, general eastern passenger agent of the Baltimore & Ohio at New York, died suddenly of a heart attack at his home in that city on September 20. Mr. Scott had been in the service of the Baltimore & Ohio for the past 43 years. He was born in Chillicothe, Ohio, on December 16, 1868, and was educated in the grammar and high schools of that city, entering the service of the Baltimore & Ohio as bill clerk in August, 1886. He was appointed freight and ticket agent at Hillsboro, Ohio, in June, 1892, and in 1894 he was appointed division passenger agent at Vincennes, Ind. He was transferred to Cincinnati in May, 1897, as traveling passenger agent of the southeast territory. In October of the same year he was appointed city passenger agent at that point and the following year he was advanced to the position of district passenger agent. He became New England passenger agent at Boston, Mass., in May, 1905, and in November, 1909, he became general eastern passenger agent, which position he held at the time of his death.

William J. Dudley, superintendent of the relief department of the Baltimore & Ohio, with headquarters at Baltimore, Md., died in that city on September 19, after an illness which lasted several months. Mr. Dudley entered the service of the Baltimore & Ohio in 1891 and for the past eleven years had served as superintendent of the relief department of that road. He was born in Baltimore, Md., on September 8, 1868, and educated in the public schools of that city. He began his railroad career as clerk in the office of the auditor of revenue in 1891, after which he became assistant to the chief clerk, later being promoted to chief clerk. He was appointed special accountant, attached to the staff of the comptroller, in 1906 and in 1917 he became assistant superintendent of the relief department, in charge of relief and pension features. He was promoted to the position of superintendent of the relief department in April, 1918, the position he held at the time of his death.

Nicholas D. Maher, who retired as president of the Norfolk & Western in April, 1924, died in Roanoke, Va., on September 24, after a brief illness. Mr. Maher was born at Blairsville, Pa. He entered railway service in 1871 and until 1873 was engaged in survey work on the Pittsburgh, Virginia & Charleston. He then became clerk in the office of the superintendent of transportation of the Pennsylvania at Altoona, Pa. In 1874, he became clerk in the office of the general superintendent, which position

Nicholas D. Maher

he held until 1883, when he entered the service of the Norfolk & Western as chief clerk to the general manager. From August, 1889, to August, 1890, he was trainmaster of the Flat Top division of that road. He was then promoted to superintendent of the Pocahontas division. In 1901 Mr. Maher left the service of the Norfolk & Western for a short period to become general superintendent of the Seaboard Air Line, returning to the Norfolk & Western in January, 1903, in a similar capacity. The following year he was appointed general manager and in July, 1907, he was also elected second vice-president. He was elected vice-president in charge of operation in November, 1912, and three years later he became first vice-president. He was elected to the presidency of the road in January, 1918, and served in that position until April, 1924, with the exception of the period from June, 1918, to March, 1920, when he served as regional director of the Pocahontas region for the Railroad Administration.

* * *

The Lehigh Valley's "Black Diamond"

Two Sections—Section Two

Railway Age

Motor Transport Section

Devoted to the Co-ordination of Railway and Highway Service

SEPTEMBER 28, 1929

TRANSPORTATION LIBRARY
UNIVERSITY OF MICHIGAN

Railways Extend Motor Coach and Truck Services

The Goal of Transportation . . . More Passenger-Miles

WESTINGHOUSE AIR BRAKES are *Efficient Helpers*

THAT which stimulated evolution of the wooden coach "two-a-day" train into a high speed all-steel express... that which promoted growth of the "toonerville trolley" to the fleet and comely street car... has in recent years permitted the common "jitney" to metamorphose into a lordly motor coach.

The railroads for three score years, electric railways for two score, and bus systems now for almost a decade, have felt its influence. Their present-day carrying capacity as measured in billions of passenger-miles annually, is due in no small degree to Air Brake control.

Bus operators are in the business to carry more passengers more miles. Their objective is safe, comfortable, and swift miles of transportation. A vital factor in its attainment is the Air Brake.

Ability to make short stops without driver fatigue or rider discomfort, and continued assurance of adequate control, enable even large capacity buses to run at economy-promoting speeds in safety.

That power brakes are necessary to give modern motor coaches the capacity for profitable passenger mileage is gaining recognition from year to year. More operators are wanting Westinghouse Air Brakes—more manufacturers are supplying that want.

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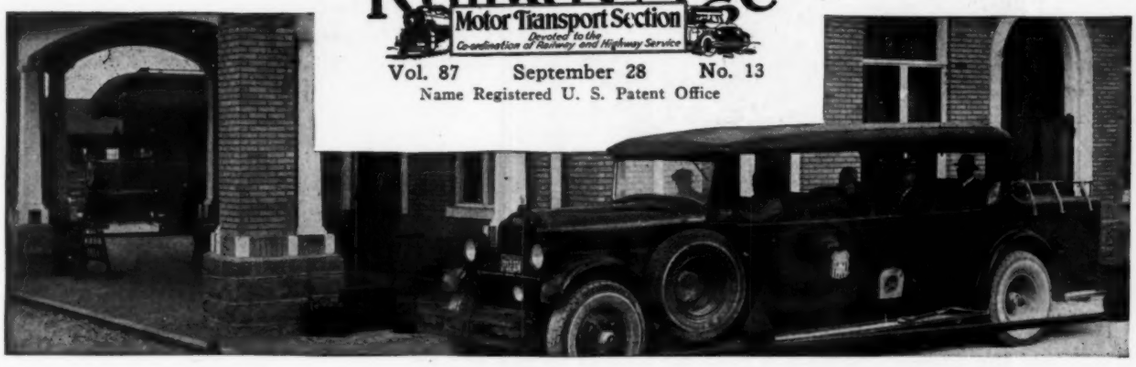
WESTINGHOUSE AIR BRAKE COMPANY
AUTOMOTIVE BRAKE DIVISION PITTSBURGH, PENNA.

Railway Age
Motor Transport Section
Devoted to the Co-ordination of Railway and Highway Service
Vol. 87 September 28 No. 13
Name Registered U. S. Patent Office



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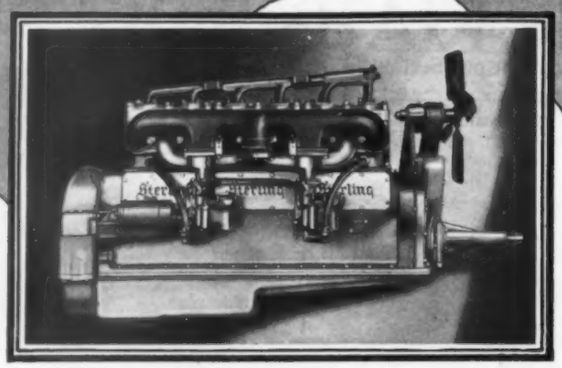

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Six Cylinder Bus Engine
150 HP

The Sterling Viking II 6 Cylinder Railcar Engine 350 HP

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The Sterling Petrel 6 Cylinder Bus Engine 150 HP

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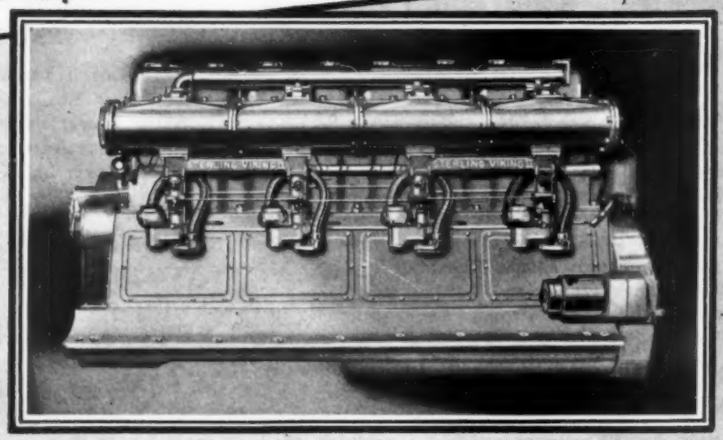


The Sterling Viking II
Six Cylinder Railcar Engine
350 HP

DOUGLAS DONALD

Railway Age
Motor Transport Section
Devoted to the Co-ordination of Railway and Highway Service

Vol. 87 *September 28, 1929* *No. 13*

More Motor Coaches, More Trucks

THE *Railway Age* presents in this issue of the *Motor Transport Section* its 1929 survey of the motor coach and motor truck, tractor and trailer operations of the Class I steam railways of the United States and the two principal railways of Canada. There has been much discussion of motor coach and motor truck operation by the steam railways during recent years. This survey indicates the result and the background of that discussion.

There can be no doubt of the increasing popularity of motor coach and motor truck operation, so far as the railways are concerned. Last year 35 Class I roads were operating motor coaches. This year, 43 are carrying passengers on the highways. Numerically, this is not a large increase, but proportionately it is. The really great increase during the past year, however, has been in the number of motor coaches operated by or for the Class I roads. Last year the survey indicated that 826 motor coaches were working for the Class I lines. This year the survey shows that 2,265 motor coaches are so operating. The increase in the length of the motor coach lines of the Class I roads has been similarly large. Last year, the motor coach route mileage of these roads was 10,755. In 1929, it is 25,697.

Four more roads are now operating motor trucks, tractors and trailers than last year, the number of such roads this year being 37. In 1928, the 33 Class I roads operating motor vehicles for the transportation of freight had 4,863 units in service. This year, the figure shown by the survey is 5,861. More shippers are enjoying the motor truck service facilities of the railways this year than last, as indicated by the increase in the number of terminals thus served, from 150 in 1928 to 399 in 1929, and by the increase in the motor truck route mileage of Class I roads, from 2,725 to 6,677.

These steady increases in the number of motor coaches and motor trucks, tractors and trailers operated by the Class I roads are the railways' answer to the problem created by new conditions in the transportation business. There is no necessity for reviewing at length those conditions which have created such a revolution in transportation in the United States. More people are travelling than ever before, but the railways have been carrying fewer passngers because of the popularity of travel on the highways. More freight is being shipped than ever before, but the railways have not been privileged to enjoy all of the increase in the freight business because of the popularity with shippers of the fast, convenient transportation service offered by motor trucks for hauls over short distances.

Another condition is the necessity which the railways face of rendering their operations as efficient and economical as possible. Necessary passenger service at many points has had to be provided at heavy cost, while the cost of handling l. c. l. freight in and out of terminals has been similarly heavy. The problem of the railways was to find some substitute form of transportation which might enable them to render necessary service as economically as possible and at the same time to render service sufficiently attractive to bring to them the greater volume of traffic available.

Several years ago a few railways indicated that they believed they had found the answer when they began motor coach and motor truck operations. Each year additional railways have agreed with these pioneers, until now a great many more motor coaches and trucks are being operated by steam railways than ever before.

Reports of plans of the railways for new motor coach and truck operations indicate that they are far from the point where they believe they have sufficient highway service. On the contrary, large though a few of the motor coach and motor truck operations of the railways now are, there is good reason to believe that the largest railway motor transport systems are still in the making. Of the railways which have tried motor coach and motor truck operation, almost none have declared it unsuccessful. The history of nearly every instance in which a railway has experimented with motor coach or motor truck service has been that expectations as to attracting additional business or reducing expense of operation have been exceeded. Furthermore, the railways are constantly finding new ways in which they can use motor coaches and motor trucks to advantage—the advantage not only of themselves, but also of their patrons.

There has indeed been a revolution in the transportation service of this country. But the railways are playing a substantial part in it, and from present indications, they will have a still larger part in the many changes to be expected in the future.

Ohio Commission Hits Railroad Contract Trucking

BY handing down an order that the New York Central, in contracting for motor truck service to handle l. c. l. freight over highways parallel to its lines, thereby makes itself a motor transport company subject, with common carrier motor truck lines, to the regulations of the commission as to certificates permitting such operations, the Ohio Commission has dealt a severe blow at a form of transportation service which has been steadily growing in popularity during recent years. The New York Central, like many other roads, contracted with a trucking organization for the handling of l. c. l. freight by motor truck between certain of its terminals in Ohio. The entire business of this truck operator was the handling of such freight for the railroad. In response to a protest of the Ohio Association of Commercial Haulers, the Ohio commission ruled that by its contract for such trucking service, the New York Central made itself a motor carrier and ordered that the operation cease until such time as the New York Central may secure from it a certificate of convenience and necessity permitting such operation.

The use of motor trucks by the railways for the transportation of freight is a comparatively recent development. It has now, however, assumed a substantial place in the railway transportation business. From the railway standpoint, the use of motor trucks in the handling of l. c. l. freight between various stations has numerous advantages, particularly that of greater economy in operating expenses. Shippers likewise benefit from this co-ordination of railway and motor truck service through the faster transportation with which they are provided under such an arrangement. It would be unfortunate, therefore, if any obstruction were put in the way of a continuance of such co-ordination of two forms of transport so beneficial to all concerned.

One point made in the Ohio commission's decision is that the trucking company with which the New York Central is contracting should be taxed as other motor carriers are taxed for its use of the highways. The fairness of this can hardly be debated. However, in requiring that railways, before making use of motor truck service, secure from the commission certificates permitting the operation, the Ohio commission is setting up the same obstacle that has delayed, if not prevented, desirable co-ordination of railway and motor coach service in so many cases. The principal purpose of the certificate plan of regulation is the elimination of unrestricted and often "wild-cat" competition between motor carriers. To a certain degree, perhaps, the New York Central, by its contract motor truck operation, is competing with certificated independent motor truck lines. It would seem, however, that to a much larger degree, it is simply extending to its own shippers a better form of service. The railway's motor truck service is purely an operating facility, which it may or may not utilize at its own discretion, and which we doubt is used to any great extent, if at all, as a bid to take traffic from competitive motor truck lines.

The interests of shippers demand that the railways be permitted to provide that form of transportation service most beneficial not only to the shippers, but to the railways themselves. The use of motor trucks by the steam railways has been one of the forward steps they have taken during recent years in the direction of better and more economical transportation service for their patrons. It is to be hoped that technicalities will not be permitted to forestall and obscure the main issue.

Meeting Shippers' Needs

STORE-DOOR collection and delivery service has never been particularly popular with railway officers in this country. Yet there exists in southern California a store-door collection and delivery service, sponsored by a railroad, which is proving successful. Since early last spring, the Pacific Electric Motor Transport Company, a subsidiary of the Pacific Electric Railway, which in turn is controlled by the Southern Pacific, has been offering shippers and consignees at a large number of localities in southern California a complete shipping service, including pickup and delivery at the doors of shippers and consignees.

Railway officers all over the country have displayed a keen interest in this operation. Utilizing the rail service of the Pacific Electric for the transportation of the shipments between stations, and providing for motor truck service between the rail stations and the doors of shippers and consignees, under contracts with trucking organizations, the Pacific Electric Motor Transport Company is attracting a very substantial and steadily growing traffic, the revenue from which is more than sufficient to pay the expenses of its operations. Although the Pacific Electric Railway plays no part in the operation except in its transportation of the freight of the motor transport company under a contractual arrangement, the railway has benefited by the increased use of its station and transportation facilities, which are adequate to absorb the additional business without additional expense. Naturally, the railway benefits also from the earnings of its subsidiary company. Shippers benefit, in turn, from the availability of such a rapid transportation service for l. c. l. freight, sponsored by a substantial company which gives good service to all, but plays no favorites.

The success of the operation of the Pacific Electric Motor Transport Company would seem to indicate that the railways are not helpless in the face of strong motor truck competition. Shippers are constantly demanding better transportation service, better service largely meaning faster service. It is only natural that a shipper should patronize the transportation agency offering the fastest transportation of his shipments to their destination. This is the reason why motor truck lines, are in many instances, securing large amounts of

short-haul l. c. l. traffic. The railways have at hand a means of meeting the needs of the shippers in their territories. The experience of the Pacific Electric Motor Transport Company would appear to prove that the meeting of the needs of shippers can only be made effective in winning back traffic lost to the motor truck lines, but can also be made profitable to the carrier.

Motor Transport Division To Meet Soon

THE Motor Transport Division of the American Railway Association will hold its next meeting in less than two months. It should be an important one. A long interval has elapsed since the last meeting of the division was held, an interval abnormally long because of the rearrangement of the meeting schedule to provide for two meetings annually instead of three. The months that have elapsed since the last meeting at St. Louis have been marked by many new developments in the field of railway and motor coach and motor truck co-ordination. A number of roads have gone in heavily for motor vehicle operation and the gradual absorption of independent motor coach lines by the railways has been carried forward more rapidly.

Those who intend to attend the next meeting of the division in Toronto have good reason to anticipate some excellent reports from the various committees of the division. Handicapped in the past by organization difficulties and lack of time between meetings in which to prepare adequate reports, the committees have now been completely organized and have had more than sufficient time in which to complete their studies. Previous meetings of the division have been marked by growing attendance and enthusiasm, and the next meeting should see an even larger number of railway officers present and active in the discussion of the many new problems which have arisen. It is not too early now for officers of the motor transport subsidiaries and of the operating, traffic and other departments of the railways themselves to begin to plan to be in Toronto from November 12 to 15.

Communication

Court Decision Hits "Contract" Subterfuge

LOS ANGELES, CAL.

TO THE EDITOR:

The constantly growing practice of wildcat truck operators of invading the territory of legitimate franchised freight lines, both rail and truck, under the guise of "private carriers" should be materially curtailed by the doctrine laid down in a decision just rendered by the California Supreme Court in the case of Haynes vs. McFarlane (78 Cal. Dec. 92). The decision is directed at the so-called contract carrier, and it clearly establishes the principle that this type of operator cannot engage in the transportation business without securing the necessary certificate from the state, merely by resorting to the subterfuge of entering into "private contracts" with his patrons.

The decision apparently places a definite limit upon the extent to which the wildcatter can go with his "contracting." Certainly, it provides an entirely new interpretation of the rather notorious "Frost Case" (271 U. S. 583), under which this sort of carrier claimed the right to operate. Frost, it will be recalled, made a single contract to haul citrus fruit upon the highway by motor truck. The railroad commission, after due investigation, claimed jurisdiction, and ordered Frost to cease operating until he should secure the necessary certificate and agree to assume the duties and obligations of a common carrier. On appeal, this order of the commission was reversed by the court, and Frost's position as a "private contract carrier" beyond the jurisdiction of the railroad commission, was, in effect, sustained. Following this decision a large number of unregulated truck operators suddenly became "contract carriers". Many of them, choosing to ignore the underlying fact that Frost made but one contract to haul one commodity, and conveniently relying upon a much broader interpretation of the decision, arrogated to themselves the right promiscuously to operate wherever they chose under "contracts" that may have been either written, or oral, or even imaginary. Frequently, by making many contracts, they have been able to extend their activities until they are enjoying all of the privileges afforded common carriers without assuming any of their duties or obligations.

Typical of this is the case just decided: Haynes, a common carrier, operates a line of motor trucks between Fresno and Hanford, Cal., under a certificate from the railroad commission. McFarlane, claiming, under the Frost Decision, to be a "private carrier" and, therefore, beyond the jurisdiction of the railroad commission, encroached upon Haynes' territory without a certificate. The commission, after due investigation, found that MacFarlane, despite his claims to the contrary was in fact a common carrier, and, as in the Frost Case, ordered him to cease operation. Instead of obeying the order, MacFarlane persisted in his contention that he was a "contract carrier," and, on the day after the commission's order became effective, actually entered into seven, and was prepared to enter into twenty more, written contracts with the various shippers. Under these contracts, MacFarlane continued to haul freight; whereupon he was enjoined and came before the courts, where the railroad commission's order to cease operation was affirmed.

The decision that MacFarlane is a common carrier technically, of course, does not reverse the prior decision that Frost was a "private carrier", because the underlying facts were different. Frost made one contract to haul one commodity and was looked upon as a legitimate contract truck operator. MacFarlane, admittedly relying on the Frost Case, made, or stood ready to make, not one, but a total of twenty-seven contracts to haul general merchandise; and in so doing, succeeded apparently in killing the goose that laid the golden egg, because the MacFarlane decision certainly provides a means of controlling those wildcatters who heretofore have been pleased to assume that the Frost decision gave them an unlimited right to "contract".

In rendering the MacFarlane decision, the Supreme Court said:

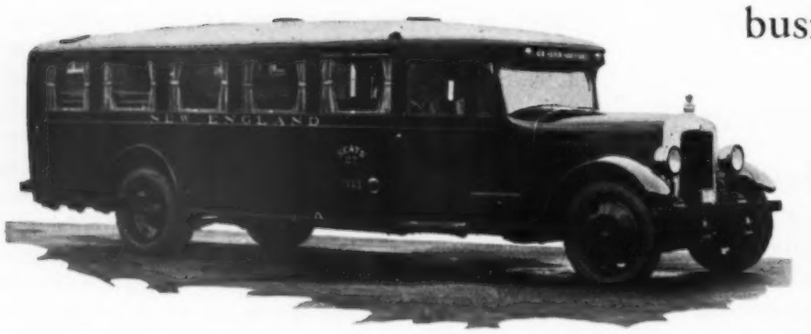
> The fact that the defendant in his contract called himself a "Private Carrier" could not make him such in the light of the undisputed facts to the contrary. Here we have a carrier, found on sufficient evidence * * * to be a common carrier, posing as a private carrier, in an obvious attempt to evade public regulation.

Moreover, the supreme court also affirmed a lower court's award of substantial damages to the franchised carrier who suffered because of the illegal invasion of his territory.

The principle laid down is clear and unmistakable. The prospects of paying damages for its violation should go far toward giving it effect.—L. B. Y.

Railways Extend Motor C

Motor vehicle operation becomes business—Class I railways are tractors and trailers, and



THE *Railway Age* presents here its 1929 survey of the motor coach and motor truck, tractor and trailer services operated by or on behalf of the Class I steam railways of the United States and the principal railways of Canada. It indicates the important part which motor vehicle operation now plays in the railway transportation business of this country, and shows the great extent of the expansion in motor vehicle operation on the part of the railways which has taken place during the past year.

The last survey of this kind, completed in June, 1928, and published in the *Motor Transport Section* of the *Railway Age* of June 23, covered all railways of whatever size. This year the survey has been restricted to Class I railways, since it was thought that a somewhat truer picture of the situation might be presented thereby. In a later issue, an article describing the motor coach and truck operations of the short line railways, based on a survey of the American Short Line Railway Association, will be presented.

More Companies Operating Motor Coaches

It appears that on August 1 of this year, 43 Class I railways were operating motor coaches. This represents a substantial increase over the number operating motor coaches at the time of the 1928 survey. In that survey it was found that while 64 railways of all kinds were operating motor coaches only 35 of these operators were Class I roads.

A still more striking picture of the growth in popularity of the motor coach with the larger steam railways, is presented, however, in the reports of the number of motor coaches operated by the Class I lines this year, as compared with the number operated last year. Based partly on unofficial estimates—which there is reason to believe are accurate, however—the Class I roads on August 1, 1929, were operating 2,265 motor coaches. This represents an extraordinarily large increase over the number of motor coaches operated by railways of such size last year, when 826 motor coaches were reported as in operation. As was the case last year, these motor coaches are being used by the Class I roads not only to replace the train service, but also materially to increase the passenger transportation facilities offered to the public.

As in the case of the number of motor coaches operated by the Class I roads, there has been a very substantial increase in the length of the motor coach routes of the steam railways. It is estimated that the motor coaches of the Class I roads this year are travelling over 36,447 miles of highways. Last year the motor coach route mileage of the Class I roads was only 10,755.

More Motor Truck Operation by Railways

At the same time that they have been increasing their motor coach operations, the Class I roads have similarly expanded their motor truck, tractor and trailer operations to improve or reduce the expenses of the provision of their freight service. In 1928, 33 Class I roads were operating motor trucks, tractors and trailers in freight service, while in 1929 this number has increased to 37. The number of freight-carrying motor vehicles which they are operating this year is reported as 5,861, as compared with 4,863 operated approximately a year ago.

During the past year the railways have extended greatly their motor truck, tractor and trailer services, so that such facilities are now available to a much larger number of shippers. The number of terminals in which the Class I roads are operating motor vehicles in freight service this year is reported as being 399, as compared with 150 terminals so served last year. Matching the extent of the increase in the number of terminals served, is the increase in the motor truck route mileage of the Class I roads. The motor truck route mileage of the Class I roads this year is 6,677 as compared to a mileage of 2,725 last year. In other words the railways are offering shippers the benefits of motor truck transportation at considerably more than twice as

Growth of Class I Railways' Motor Coach Services

	1929	*1928*
Number of Roads Operating Motor Coaches	43	35
Number of Motor Coaches Operated	2,265	826
Aggregate Motor Coach Route Mileage	36,447	10,755

Coach and Truck Services

important part of the transportation operating nearly 6,000 trucks, over 2,200 motor coaches

many terminals and over substantially more than twice as many miles of motor truck routes this year as last.

For the first time an attempt has been made in this year's survey to determine what results the Class I roads are securing from their motor coach operations. The returns are not complete, but they are adequate to indicate that motor coach and truck operation by the railways is being carried on successfully. Twenty of the Class I roads reported the number of passengers they are at present carrying in their motor coaches, estimated on an annual basis. These twenty roads report the number of passengers they are carrying, on the basis of their present operations, as being 13,806,435. Since no attempt was made last year to secure estimates of this sort covering 1928 operations, it is impossible to make a comparison of the number of passengers being carried by the steam railway motor coaches this year and last year.

Twenty-six railways reported the extent of their motor coach operations in terms of motor coach miles, estimated on an annual basis. These twenty-six roads reported that they are now operating on the basis of 44,715,207 motor coach miles annually. The number of motor coach miles operated by the steam railways was not reported last year, but it is obvious that in this case, as in the number of passengers carried, there has been a very marked increase this year as compared with 1928.

In an attempt to determine to what extent the motor coach operations of the railways are being carried on in substitution for passenger train service, one item in the questionnaire distributed to the Class I roads this year asked them to indicate the number of train miles they had replaced with motor coach service. Most of the roads reported that they had not taken off any train service as the result of the establishment of their motor coach operations, but a few roads did report such replacements. Examination of the returns indicates that 14 Class I roads have replaced, on an annual basis, 2,564,439 passenger train miles. In each case where there has been replacement of train service with motor coach service, it is notable, however, that the interests of the public and its need for passenger transportation service are being protected more than adequately. In every case the number of train miles replaced is very much less than the number of motor coach miles operated in substitution.

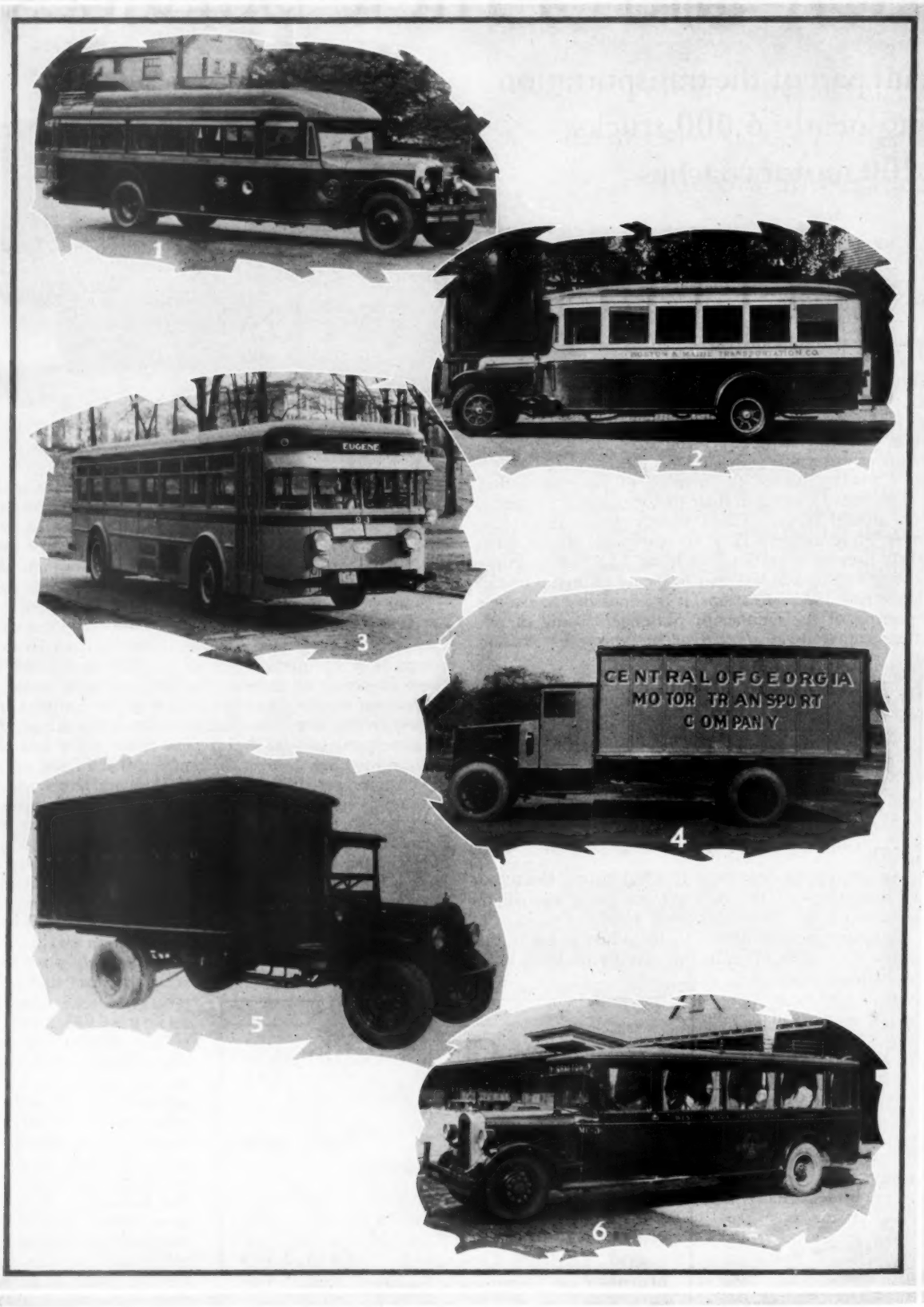
Some of the most interesting statistics presented have to do with the operating costs of the motor coaches operated by the Class I roads. There is no basis of comparison of operating costs in 1929 and 1928, but there is reason to believe that the operating costs are decreasing somewhat as the extent of the railways' motor coach services is increasing. Motor coach operating costs per mile reported this year range from less than 20 cents to slightly over 30 cents. Most of the operating costs reported lie well within these extremes and the average is in the neighborhood of 25 cents per mile.

It has been more difficult to determine the performance of the motor trucks, tractors and trailers operated by the railways. However, a few of the roads have reported on the tonnage they are handling in their motor vehicles and on the extent of their replacement of freight train service with motor truck service. Thirteen roads, most of them, with the exception of the New York Central, operating motor trucks only on a small scale, report that their motor vehicles are handling 6,048 tons of freight daily. Ten roads also with relatively small operations, report the handling of 26,282 ton miles daily. Only six roads report replacement of freight train service by motor truck service, these six indicating that they have been enabled to take off 491 freight train miles daily as the result of the establishment of their motor truck, tractor and trailer services.

Space limitations make

Growth of Class I Railways' Motor Truck Services

	1929	*1928*
Number of Roads Operating Trucks, Tractors and Trailers	37	33
Number of Trucks, Tractors and Trailers Operated	5,861	4,863
Number of Terminals Served	399	150
Total Truck Route Mileage	6,677	2,725



1. Missouri Pacific Yellow Coach
2. Boston & Maine Studebaker
3. Southern Pacific Twin Coach
4. International in Central of Georgia Service
5. Mack Truck Operated by New Haven
6. An A.C.F. in B. & O. Service

it impossible to describe in detail the developments in connection with motor coach and truck operation on all the railways during the past year. A few outstanding instances of the development of motor coach and truck operation of major size may be mentioned, however. In the east, the outstanding event was the purchase by the Pennsylvania of a controlling interest in several important independent motor coach operating companies, operating in the region between New York and Washington, and its purchase of a substantial interest in the Greyhound Lines, operating a motor coach system of exceptional magnitude in the east and central west. The Greyhound Lines is functioning as an operating facility of the Pennsylvania, providing motor coach service over a number of routes, operating certificates for which were secured by the Pennsylvania's subsidiary, the Pennsylvania General Transit Company.

The Baltimore & Ohio has made a substantial start in the development of a large motor coach system, establishing a number of motor coach lines in West Virginia, which are expected to be the nucleus of a much larger highway passenger service. The New Haven has inaugurated a motor truck service, operated by the New England Transportation Company, which is expected to grow rapidly.

In the middle west there have been two outstanding events: the entrance of the Chicago, Burlington & Quincy into motor coach operation on a large scale, and the sale of the Great Northern motor coach operating subsidiary, the Northland Transportation Company, to the Greyhound Lines, in which latter company the Great Northern has taken a financial interest. The new operating company which has replaced the Northland Transportation Company is the Northland-Greyhound Lines. The Burlington has established an extensive system of motor coach routes in Nebraska and is taking steps to materially expand its highway system in the near future.

In the southwest, two major motor transport operations of steam railways have developed. These are the operations of the Missouri Pacific Transportation Company, subsidiary of the Missouri Pacific Lines, and the Southwestern Transportation Company, subsidiary of the St. Louis Southwestern. In an unusually short time, both of these companies have established very extensive systems of motor coach lines, while the Southwestern Transportation Company has put into service a similarly large system of motor truck lines.

The Union Pacific and the Southern Pacific are two more roads which have come into prominence as motor coach operators during the past year. The Southern Pacific was a large operator of motor coaches a year ago, but it is now operating a much more extensive system of motor coach lines, not only directly through subsidiaries, but also through its affiliation with the holding company which controls virtually all of the substantial motor coach lines operating in Southern Pacific territory—Pacific Transportation Securities, Inc. The Southern Pacific has a one-third interest in this company. The Union Pacific likewise has been operating motor coaches for some time, but only during the past few months has it begun to extend them on a large scale. Largely through the purchase of independent lines, it is now the principal motor coach operating company in the state of Nebraska, its motor coaches augmenting the passenger service facilities of its rail lines. Similarly, it has established motor coach lines extensively in the territory of the Oregon Short Line and the Oregon-Washington Railroad & Navigation Company, while in the southwest, two more subsidiary companies are operating large numbers of motor coaches in Utah and in southern California.

The motor truck operations of the railways suffered something of a setback as a result of the Interstate Commerce Commission's decision on motor trucking in the city of New York. It is notable, however, that the use of motor trucks in freight transportation service was approved in principle by the commission, its objection being to the way in which motor trucks were used in New York.

Although these operations are not covered in the present survey, the railways continue to be large users of motor truck service in Cincinnati, Ohio and in St. Louis, Mo., through contracts for terminal motor truck, tractor and trailer service with the Motor Terminals Company in Cincinnati and the Columbia Terminals Company in St. Louis. The railways also possess the largest motor truck, tractor and trailer operating organization in the country through their ownership of the Railway Express Agency, Inc.

The motor coach and motor truck operations of the Class I roads are described in detail in the following tabulations. Nearly all of the statistics are those furnished officially by the railways, but in a few cases unofficial estimates have had to be used to complete the compilation.

Motor Coach Services of Class I Railways

Railway	Motor Coach Operating Company	No. of Motor Coaches Operated	No. of Miles of Routes	Motor Coach Miles Operated*	No. of Passengers Carried*	No. of Passenger Miles	Operating Cost Per Mile	Passenger Train Miles Replaced*
Atchison, Topeka & Santa Fe	Santa Fe Transportation Company	60	200	101,054	24,088	434,490	$.39	.....
Atlantic City Railroad	(Included in Reading Statistics)							
Baltimore & Ohio	West Virginia Transportation Company	36	250	.....	.....	.....	..	.....
Boston & Maine	Boston & Maine Transportation Company	91	1,250	2,354,477	1,393,108	.....	.31	213,310
Canadian National	Canadian National Electric Railways	3	7	65,182	271,574	678,686	.19	.....
Canadian Pacific	Canadian Pacific Transport Company	3	5	138,727	395,814	.....	.23	42,254
Central of Georgia	Central of Georgia Motor Transport Company	3	112	102,985	17,531	.....	.26	99,280
Central of New Jersey	Jersey Central Transportation Company	3	40	.....	.....	.....	..	.....
Chesapeake & Ohio	Contractor	5	10	.....	.....	.....	..	.....
Chicago & Alton	Alton Transportation Company	10	150	283,482	88,012	2,149,438	.23	.....
Chicago & North Western	Contractors	3	38	57,832	.....	.....	.19	57,832
Chicago, Burlington & Quincy	Burlington Transportation Company	20	655	3,506	.....	.....	..	.....
Chicago, Milwaukee, St. P. & Pac.	Railway and Contractors	31	265	322,699	.....	.....	.26	.....
Chicago, Rock Island & Pacific	Contractor	1	....	.....	.....	.....	..	.....
Colorado & Southern	Denver & Interurban Transportation Company;	12	280	.....	.....	.....	..	.....

Railway	Motor Coach Operating Company	No. of Motor Coaches Operated	No. of Miles of Routes	Motor Coach Miles Operated*	No. of Passengers Carried*	No. of Passenger Miles	Operating Cost Per Mile	Passenger Train Miles Replaced*
Denver & Rio Grande Western	Denver-Colorado Springs-Pueblo Motor Way, Inc.; Rio Grande Motor Way; Rio Grande Motor Way of Utah; Western Slope Motor Way	22	940	775,000	82,000	5,400,000	.25	148,000
Georgia Railroad	Georgia Highway Transport Company	1	10	29,883	8,000	80,000	.19	30,823
Great Northern	Northland Greyhound Lines	175†	4,000†	.....	.....	.....	..	.....
Illinois Central	Central Transportation Company	1	100	73,000	11,000	432,000	.28	68,000
Los Angeles & Salt Lake	Utah Parks Company; Union Pacific Stage Company	75	565	485,552	30,113	2,376,531	..	92,126
Maine Central	SamOset Company	4	75	79,888	12,498	367,659	.29	.....
Missouri-Kansas-Texas		3	....	.....	.....	.....	..	.....
Missouri Pacific	Missouri Pacific Transportation Company	151	3,600	8,000,000	1.300,000	36,000,000	.17	360,000
Nashville, Chattanooga & St. Louis	Nashville, Chattanooga & St. Louis Motor Transit Company	2	27	54,718	31,011	270,277	.31	60,255
New York, New Haven & Hartford	New England Transportation Company	270	2,383	9,031,121	5,402,102	159,344,232	.29	1,030,602
Nevada Northern	Contractor	1	4	10,376	15,357	.....	.27	.....
New York Central		5	20	.....	.....	.....	..	.....
Norfolk Southern	Norfolk Southern Bus Corporation.	6	35	.....	.....	.....	..	.....
Oregon Short Line	Union Pacific Stages, Inc.	87	2,564	4,642,750	.....	.....	..	.....
Oregon-Washington Railroad & Navigation Company	Union Pacific Stages, Inc.	(Included in Oregon Short Line Statistics)						
Pennsylvania	Pennsylvania General Transit Company; Greyhound Lines; People's Rapid Transit Company	700†	12,000†	.....	.....	.....	..	.....
Reading	Reading Transportation Company	52	499	1,241,873	765,801	.....	.24	355,229
Richmond, Frdericksburg & Potomac	Richmond, Fredericksburg & Potomac Transportation Company	9	131	.....	.....	.....	..	.....
Rutland	Rutland Transportation	2	134	419,421	7,119	120,799	.25	2,464
St. Louis-San Francisco		1	5	.....	.....	.....	..	.....
St. Louis Southwestern	Southwestern Transportation Company	52	1,166	2,489,472	.....	.....	..	308,124
Seaboard Air Line	Motor Transportation Company of the South	7	165	240,900	.....	.....	.30	.....
Southern		5	65	.....	.....	.....	..	.....
Southern Pacific	Southern Pacific Motor Transport Company	225	3,213	9,100,000	4,244,000	.....	.23	.....
Spokane, Portland & Seattle	Spokane, Portland & Seattle Transportation Company	41	225	949,370	235,698	7,297,654	.24	86,140
Texas & Facific	Texas & Pacific Coaches, Inc.	2	9	.....	.....	.....	..	.....
Union Pacific	Interstate Transit Line	80	1,225	4,462,125	750,828	.....	..	.....

* Computed on Annual Basis. † Estimated—unofficial.

Motor Truck Services of Class I Railways

Railway	Motor Truck Operating Company	No. of Units Operated			No. of Miles of Line Routes	No. of Terminal Operations	Aggregate Tonnage Handled*	Aggregate Ton Miles*	Freight Train Miles Replaced*
		Trucks	Tractors	Trailers					
Atchison, Topeka & Santa Fe	Santa Fe Transportation Company	3	....	1	17	....	....	....	....
Atlantic Coast Line	Railway	6	....	....	24	5	....	....	27
Baltimore & Ohio	Contractors	200†	(Included in truck total)		....	....	....	....	....
Boston & Maine	Boston & Maine Transportation Company	133	14	33	895	18	1,300	16,110	....
Buffalo, Rochester & Pittsburgh	Contractor	1	....	....	54	....	4	51	105
Canadian National	Canadian National Express Company	500†	....	....	....	....	....	....	....
Canadian Pacific	Canadian Pacific Express Company.	500†	....	....	....	....	....	....	....
Central of Georgia	Central of Georgia Motor Transport Company	3	....	....	100	....	18	....	88
Central of New Jersey	Jersey Central Transportation Company	1	....	....	35	....	....	....	80
Chesapeake & Ohio	Contractors	8	....	....	5	....	....	....	....
Chicago & North Western	Contractor	1	....	....	5	....	....	....	....
Chicago, Milwaukee, St. P. & Pac.	Contractor	1	....	....	78	....	....	....	....
Chicago, Rock Island & Pacific	Rock Island Motor Transit Company	...	1	4	72	6	24	....	....
Chicago, St. Paul, Minn. & Omaha	Contractor	10†	....	....	....	1	....	....	....
Delaware, Lackawanna & Western	Contractor	42	3	7	....	....	492	5.904	....
Denver & Rio Grande Western	Rio Grande Motor Way, Inc.; Western Slope Motor Way, Inc.	10	....	....	400	....	20	900	....
Erie	Contractors	50†	15†	60†	....	....	....	....	....
Great Northern	Northland Transportation Co.; Contractor	1	3	17	....	....	....	....	....
Lehigh Valley	Contractors	31	16	31	....	14	364	1,600	....
Long Island	Contractors	10†	5†	20†	....	....	....	....	....
Maine Central	SamOset Company	3	....	....	47	....	3	....	....
Michigan Central	Contractor	2	....	1	81	....	20	201	....
Missouri Pacific	Contractor	1	....	....	15	....	....	....	....
Monongahela Railway	Contractor	2	....	....	27	....	10	265	....
Nashville, Chattanooga & St. Louis	Nashville, Chattanooga & St. Louis Transit Company	1	....	....	28	....	....	....	....
New York Central	Contractors	2,500†	(Included in truck total)		1,300†	259	3,744	....	....
New York, Chicago & St. Louis	Contractors	....	3	9	....	....	....	....	....
New York, New Haven & Hartford	New England Transportation Company	10	....	....	....	24	40	960	....
Norfolk Southern	Norfolk Southern Bus Corporation.	1	....	....	25	....	....	....	....
Northern Pacific	Contractor	3	....	....	....	2	....	70	....
Pennsylvania	Contractors	542†	115†	688†	2,000†	....	....	....	....
Pittsburgh & Lake Erie	Contractor	3	....	....	138	....	9	222	113
St. Louis Southwestern	Southwestern Transportation Company	45	....	....	1,333	8	....	....	....
Southern Pacific	Contractors	25†	6†	60†	....	....	....	....	....
Virginian	Contractor	2	....	....	....	....	....	....	....
Wabash	Contractor	..	4	12	....	....	....	....	....
Western Pacific	Contractor	....	10†	60†	....	....	....	....	....

* Daily Average. † Estimated—unofficial.

Ready for Service in One of the Greyhound Garages at Chicago

Maintaining the Greyhound Lines' Motor Coaches

Service and repair facilities and organization plan of the largest operator on the highways

By W. A. Duvall
General Superintendent of Maintenance, The Greyhound Lines

THE Greyhound Lines operate motor coaches from coast to coast and from the Great Lakes to the Gulf of Mexico. The control of operation and maintenance over such a vast territory naturally presents some unusual problems. The manner in which they are solved may be of interest and value to other motor coach operators.

Taking a leaf from the experience of the railroads, the Greyhound Lines, for operation and maintenance purposes, have been divided into regions, and these regions have been subdivided into divisions. The Greyhound Lines proper operate the lines east of the Mississippi, except those in New York state and in Virginia. The former are known as the Colonial-Greyhound Lines, and the latter as the Richmond-Greyhound Lines. The lines west of the Mississippi are known as the Pickwick-Greyhound Lines, those on the west coast as Pickwick Stages, California Transit and Oregon Stages. Those in the Northwest are known as the Northland-Greyhound Lines. Inasmuch as the operations in each region are quite similar, this article will deal with but one region, that operated by the Greyhound Lines proper.

The control of operation, maintenance and traffic for this region is centered at Chicago, while divisional control is exercised by the superintendents stationed at strategic points over the system where the major lines converge. These superintendents, of which there are ten, are located at the following points: Chicago, Detroit, Mich., Cleveland, Ohio, Pittsburgh, Pa., Philadelphia, Washington, D. C., Atlanta, Ga., Cincinnati, Ohio, Indianapolis, Ind., and St. Louis, Mo.

Policies Established at Headquarters

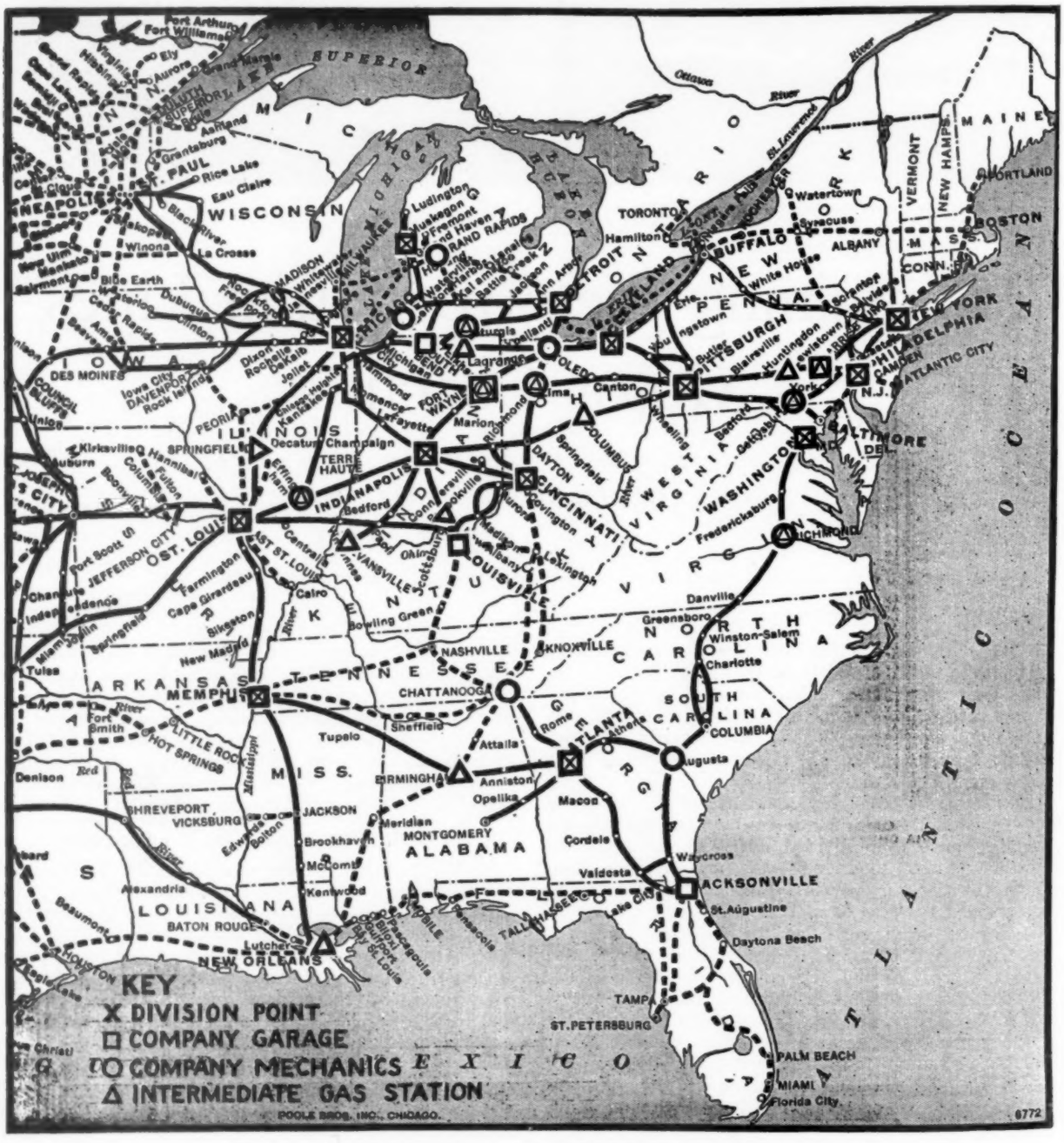
Working under policies established by the Chicago headquarters, these men are responsible for every phase of operation, maintenance and traffic in the territory under their jurisdiction, but work closely with the Chicago headquarters staff and look to it for counsel and assistance in their problems. The general superintendent of operation, the manager of maintenance, the general traffic manager and other officials of the company, make periodic trips of inspection to the various division points. In addition, several general meetings of all superintendents and department heads are held each year, at which time operating, maintenance and traffic policies are considered.

Complete garage and mechanical service shops are

located at all division points, and most of these are also equipped to do body repair work and painting. Besides the large company-operated garages at the more important terminal centers listed above, we have established small service stations at cities and towns that are less important from an operating and maintenance standpoint. These service stations are maintained by the Greyhound Lines and we have our own men on duty, day and night. We have tried for some time to eliminate the necessity of depending upon local garage facilities to care for minor repairs and road failures because the average garage mechanic knows little or nothing about repairing a motor coach. This system of small service tends in large way to eliminate this problem, as the stations are located sufficiently close together so that we can dispatch one of our own men just as quickly as a local mechanic, and we are certain of better repair work in emergencies.

To care for emergency road repairs which they cannot make themselves, drivers are equipped with emergency purchase orders. No driver is permitted, however, to order repairs costing in excess of $5 without telephoning the nearest dispatcher for authorization. Intermediate gas stations are located midway between divisions so that coaches may be refuelled at contract prices. The map reproduced herewith indicates the location of division points, garages, field service stations and gas stations over the territory.

The same method of servicing coaches is followed at all division points. The actual procedure is somewhat



Operation and Maintenance Set-Up of the Greyhound Lines

changed in the different garages because of variations in the plant layouts, but every coach, whether it runs out of Chicago, Pittsburgh or any of the other maintenance centers, is serviced in conformity with the same general program. The control of maintenance and all the records pertaining thereto center at the office of the general superintendent of maintenance at Chicago.

Our policy is to keep each motor coach on the road from 10 to 15 hours a day. It is then held over in the division garage from 9 to 14 hours, and takes the identical run in the opposite direction. Every 48 hours a coach has made a complete round trip. It is during these intermediate layovers at the division points that the equipment is serviced.

After the driver has brought his coach in from a run, he makes out his report to the maintenance department. He lists any indications of defects in his coach and makes recommendations for repairs. We stress the importance of these reports, and it is generally known that their thoroughness is an important factor in promotion. The fact that each driver operates the same coach each day leads him to report completely so that his own record of road failures will not be jeopardized.

Servicing Procedure

The first step in servicing the equipment is washing. After the coaches have been washed, they are moved up to the grease racks. Our rigid inspection program takes place while the coaches are over the grease pit, and is one of the most important steps in our maintenance plan. Having first examined the driver's report and noted the defects listed thereon, the inspector goes over the coach, inside and out, noting the condition of the seats, interior lights and upholstery, body, springs, motor, drive mechanism, wheels and tires. The reports of the inspector and the driver are incorporated into the Service Report, so that when the coach reaches the service floor full instructions are on hand for the foreman and mechanics. From the information given by the Service Report, the foreman picks his crew. Most of the men specialize in specific work, and repair crews are selected accordingly.

When the coach has passed through the service floor, it is ready for the road tester, who takes it out for a short test run, noting any possible defects, particularly

Upholstery is Vacuum-Cleaned After Each Run

Repainting One of the Greyhounds in the Chicago Body Shop

in those parts of the mechanism that were mentioned as faulty in the Service Report. Any newly discovered imperfections or uncorrected ones are recorded, and if necessary, the coaches are brought back to the service floor for further adjustments.

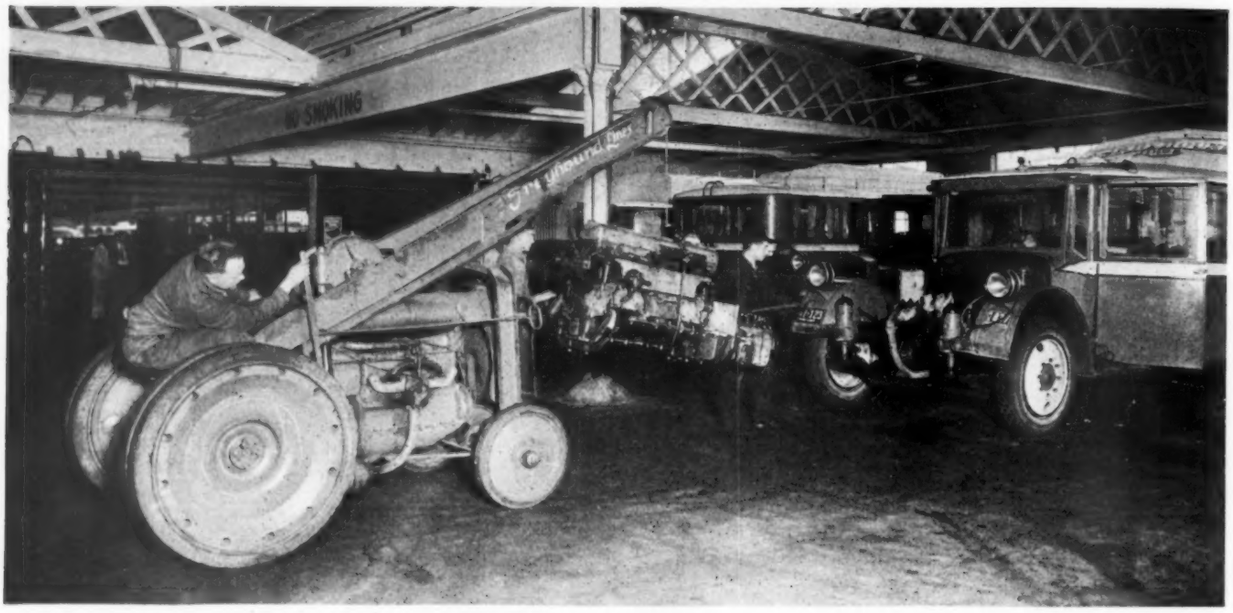
The last step in the service routine is the polishing and vacuum-cleaning of the coach. A movable vacuum-cleaning apparatus is used to go over the floors, seats and upholstery of each coach. The windows and body are then polished so that the coach is spick and span when it goes out on the road. When this routine has been completed, the coach is lined up at the far end of the garage to await orders from the dispatcher.

Special Inspections

Although the daily inspection mentioned above is as complete as possible, its thoroughness is necessarily limited, and only the more obvious defects can be corrected; so we have built up an extensive program of special inspections. Formerly these check-ups were conducted on a time basis, usually at 15-day intervals. We realized that time, as a basis for determining when such inspections were necessary, was inadequate, due to the greater daily use, measured in miles, of one coach as against another. So recently all special inspection has been placed on a mileage basis, which has proved most satisfactory.

These inspections are made after 1,000, 5,000 and 20,000 miles of operation. Those parts of the mechanism that require the most frequent attention are gone over at the end of each 1,000 miles; some, not subject to as hard usage, are checked up after 5,000 miles, and those that need only an occasional going over are on the 20,000 mile inspection. These routines are so developed that every detail of the coach is looked over at least once every 20,000 miles, some of them several times during that interval of operation.

All inspections based on mileage require a complete and accurate record of miles travelled. Each coach carries with it at all times a mileage card, and the man who makes up the Service Report for the coaches also brings forward the number of miles operated for that day to a new total. A copy of this record is sent in to the



Installing a Rebuilt Motor Unit

divisional headquarters and is recorded on mileage cards kept in the garage office. When the Service Report man sees from the mileage record that the coach is in line for one or more of the special inspections, he makes this notation upon the report and the foreman must personally certify that these instructions have been carried out.

Careful Records of Repairs

All records of repairs are kept in great detail. Every unit and part, as well as each coach, is numbered, and records are maintained so that we know what repairs have been made. These are also cross-referenced so that we know whether units are installed in a coach, and if so, what coach; whether they are in stock, and if so, in which stock room they are located. A check-up of each unit and the mileage records will show accurately whether or not they are giving the normal amount of service.

These records are made in triplicate. One copy is retained by the garage, one goes to the cost department and one to the general superintendent of maintenance. In addition, each garage forwards to the general superintendent of maintenance a daily summary of all work done. This covers major overhaul, paint shop work, repairs, coaches held for lack of parts, and road failures. By consulting these daily reports with the triplicate card record kept on every coach, the superintendent of maintenance is in a position to determine immediately the maintenance facts on any piece of equipment in use on the system.

We have endeavored to develop a cost accounting system which is as simple as possible, yet will permit us to determine the necessary figures on costs. Each coach and each unit has a separate expense account. Any units removed from the coaches are repaired, and after the costs have been ascertained, the charges are apportioned back to the coach in which the unit was assembled when it became necessary to repair it.

Check Gas and Oil Consumption

An elaborate system of checking-up on gas and oil consumption has warded off many costly road failures for the Greyhound Lines. We have our own lubricating engineer, who keeps records of all gas and oil consumed by each coach. We have found this to be a very sensitive indicator of motor disorders, and one that gives us warning of difficulty before it would be noticed by any other means of checking motor conditions. If a motor is consuming more than the usual amount of either gas or oil, it is a fairly safe guess that something is radically wrong, and the motor is removed and thoroughly inspected and tested to see where the difficulty lies. Our lubricating department maintains its own laboratory for testing gas and oil, where experiments are conducted to determine what grade of gas and oil will give us the most efficient and economical service.

Chicago is the headquarters for our system of stock rooms, and all units and parts are requisitioned directly therefrom. We maintain complete stock rooms at all our division points, and when they begin to run low on certain materials, new supplies are sent from the Chicago stock room.

Heavy Overhaul Plant at Chicago

At present, most of the heavy overhauling and reconditioning is done at the special plant in Chicago, although similar overhauling garages are maintained at Detroit, Cincinnati and Pittsburgh, so that it is not necessary to route coaches from distant points into Chicago for this type of work. Each coach is completely torn down, overhauled and rebuilt about once a year. This reconditioning includes the chassis, motor and body, including modernizing as far as possible, such as raising roofs, installing inside baggage racks, etc. When a coach comes out of this rebuilding process, with every bolt tightened, the motor tuned up and the body rebuilt and painted, it looks and runs like new.

It has been possible, in the space of this article, to touch but briefly on a number of important phases of maintenance. Subsequent articles will outline more in detail the inspection system developed by the Greyhound Lines, the unit overhaul system, which has proved so effective, and will describe the two new model plants at Chicago and Detroit, which are at present nearing completion.

What Does Truck Operation Cost?

Efficient maintenance methods and daily check on operating expenses keep Railway Express Agency's costs low

IN a city trucking operation, the wear and tear resulting from traffic congestion and the greater accident hazard may increase maintenance costs to double what they may be in cities with no congestion. This is shown in a striking way by a comparison of the costs of maintaining the motor vehicles of the Railway Express Agency. Maintenance of all vehicles of this company, no matter where they are located, is under the supervision of one general superintendent, which results in methods being standardized in every section of the country.

The motor truck fleet in New York City is composed of 393 units of sizes as shown in Table I. Under normal conditions all 3½- and 5-ton trucks operate on both a day and night shift. The day shift does delivery duty in the morning, the truck having been loaded the night before, and pick-up duty in the afternoon. This brings the truck loaded to the terminal in time for the second shift to unload it and use it for transfer work between the various railroad and steamship terminals during the night. One and two-ton trucks are used for pick-up and delivery service only.

Table 1—Motor Trucks in New York Metropolitan District

Less than 2 Tons	39
2 Tons	57
3½ Tons	253
5 Tons	2
5 Ton Tractors	42

The Express Agency has its own loading platform at all important transfer points and in the larger ones they are literally open air garages, the drivers reporting for duty at the platform rather than at the garage. For this reason a truck may not get to its garage oftener than once a week.

Tractors and trailers are used only for transfer work and are placed at those points where the volume of business requires that shipments be transferred at all times of the day. In such places one tractor will take care of several trailers, moving one while the rest are being loaded, and will be kept in service 24 hours a day.

Maintenance costs are based on a per day rate, a day consisting of one 8-hour shift. In a city operation of this kind a great amount of time is spent at the customer's receiving platform or at the railroad terminal waiting for shipments to be loaded on the truck. Also the distance between transfer points may be only a mile or so, with a capacity load to be shifted at each end of the trip. For this reason the daily mileage is comparatively low, costs on a per mile basis do not give a true indication of the service the truck has rendered and no actual mileage records are maintained. In New York City the estimated average is 30 miles or less per day.

Costs Decreasing

Table II, covering the entire fleet, shows that costs have consistently decreased since 1925 due to greater economy in the use of gasoline and oil and less repair expense.

Table III, showing the costs of maintenance in 24 representative cities for the year of 1928, indicates that

Table II—Statement of Cost of Operation of Gasoline Motor Vehicles. (Five-Year Period)

Motor Vehicles and cost of maintenance	1924 Total	1924 Per truck per day of service	1925 Total	1925 Per truck per day of service	1926 Total	1926 Per truck per day of service	1927 Total	1927 Per truck per day of service	1928 Total	1928 Per truck per day of service
(1) Number Owned	1,484	..	1,542	..	1,597	..	1,802	..	2,043	..
(2) Number in Service	.....	..	.....	..	.....	..	.....	..	.....	..
(3) Days in Service	511,948	..	534,681	..	585,745	..	626,866	..	701,852	..
(4) Total Mileage	14,057,300	27½	14,403,273	27	15,778,540	27	15,168,899	24	15,814,757	22½
(5) Gasoline	$558,507	1.09	$631,785	1.18	$674,552	1.15	$600,115	.96	$605,399	.86
(6) Cylinder Oil	49,486	.10	50,281	.09	48,346	.09	45,819	.07	43,497	.06
(7) Garage Expenses	731,273	1.43	766,578	1.44	774,666	1.32	793,137	1.26	855,054	1.22
(8) Total	1,339,266	2.62	1,448,644	2.71	1,497,564	2.56	1,439,071	2.29	1,503,950	2.14
(9) Repairs—Batteries	.....	..	.....	..	.....	..	.....	..	.....	..
(10) Tires	69,522	.14	107,993	.20	116,930	.20	101,262	.16	87,797	.12
(11) Painting	19,644	.04	28,436	.05	32,990	.06	35,656	.06	48,844	.07
(12) Body	126,530	.25	138,560	.26	126,396	.22	137,432	.22	153,680	.22
(13) Chassis	966,475	1.88	957,172	1.79	944,171	1.60	927,477	1.48	929,159	1.32
(14) Total Repairs	1,182,171	2.31	1,232,161	2.30	1,220,487	2.08	1,201,827	1.92	1,219,480	1.73
(15) Grand Total	2,521,437	4.93	2,680,805	5.01	2,718,051	4.64	2,640,898	4.21	2,723,430	3.87

Three and One-Half-to Five-Ton Truck Used for Transfer Service

in the large cities costs are consistently higher than in the small cities. This is due, in part, to traffic, congestion, more frequent accidents, and also to the higher wages paid to the mechanics and the garage staff and to the expense of maintaining a city garage of possibly several stories with the attendant elevator expense.

In these statements, items 1 to 6 are self-explanatory. Item 7, garage expense, includes light, heat and maintenance of the building, and also washing and greasing of the trucks, but no mechanical repairs. Item 10, tires, covers new tires used to replace those worn out. The company has no tire repairing equipment and all cases of premature wear are taken to the manufacturer for adjustment.

In the New York district, item 11, painting, is included in item 12, body repairs. Chassis repairs, item 13, covers the mechanical inspection, all running repairs and the complete overhaul at each 18-month period.

Unit Repair System

Maintenance costs, however, do not show the time and money lost because of the truck being held out of service while waiting for repairs to be completed. To keep this expense as low as possible, the company has developed a unit repair system. Briefly summarized, it consists of keeping one or more new or overhauled units, such as a motor steering gear, rear axle, etc., on hand at all times for each make and size of truck in the fleet. If a replacement is necessary, the foreman of the service garage calls on the storeroom for the unit he requires, and by the time he has the worn unit removed from the truck the overhauled unit is ready to be put in place. This service is used also by the country districts, the spare unit in this case being sent over the company's lines.

The motor vehicle department has developed, under the direction of E. E. LaSchum, a very complete system of inspection and overhaul of its equipment, which was described in detail in the June 22 issue of the *Motor Transport Section* and will be mentioned here only as it affects maintenance costs. Briefly, each truck is inspected once each day, usually when it returns to the garage. Any repairs required at this time are promptly made, ordinarily on the same day, by the inspector or garage mechanic. About every 18 months the truck is brought in for a thorough inspection and a general overhaul but only those parts are overhauled that show need of attention. However, if the inspector is not confident that the unit will go until the next overhaul period without giving trouble, he is authorized to replace it. Trucks operated out of the city are inspected once a month by a traveling inspector. Each truck is given a thorough lubrication once a week in its service garage.

This maintenance system has a long period of experience behind it and has been found to keep the equipment up to a high standard of efficiency.

Table III—Statement of Cost of Operation, Per Truck Per Day of Service, of Gasoline Motor Vehicles From January 1, 1928, to December 31, 1928

Motor Vehicles and cost of Maintenance	New York	Boston	Buffalo	Philadelphia	Chicago	Cleveland	Detroit	Cincinnati	Akron	Washington	Pittsburgh	Kansas City	St. Louis	Omaha	Baltimore	Dallas	Newark	Toledo	Nashville	Atlanta	New Orleans	San Francisco	Los Angeles	Seattle
(1) Number Owned	393	92	42	108	298	77	91	61	26	21	103	88	77	43	29	55	32	41	22	70	31	82	121	40
(2) Number in Service	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
(3) Days in Service	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
(4) Total Mileage	30	..	..	25	32	24	22	22	23	24	20	25	19	22	19	43	19	24	20	16	30	30	29	
(5) Gasoline	$.92	$.69	$1.33	$1.08	$.90	$1.07	$1.12	$.75	$.63	$.66	$.82	$.99	$.82	$.57	$.94	$.56	$1.18	$.63	$.59	$.76	$.72	$.62	$.61	$.62
(6) Cylinder Oil	.07	..	..	.09	.06	.07	.06	.07	.03	.05	.04	.09	.06	.05	.03	.06	.10	.04	.06	.06	.10	.05	.09	.08
(7) Garage Expenses	1.36	1.17	1.27	.89	1.55	1.49	1.20	1.03	1.47	.86	1.09	1.00	1.23	1.06	1.70	1.43	1.24	1.34	.89	.76	.74	.88	.72	1.32
(8) Total	2.35	1.86	2.60	2.06	2.51	2.63	2.38	1.85	2.13	1.57	1.95	2.08	2.11	1.68	2.67	2.05	2.52	2.01	1.54	1.58	1.56	1.55	1.42	2.02
(9) Repairs—Batteries	..			..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
(10) Tires	.06			.16	.17	.18	.15	.11	.05	.19	.16	.24	.13	.16	.19	.28	.13	.11	.09	.15	.07	.16	.13	.10
(11) Painting	..	2.24	3.18	.15	.10	.13	.07	.12	.02	.06	.08	.11	.10	.08	.11	.12	.04	.06	.06	.05	.13	.12	.10	.05
(12) Body	.27			.28	.35	.21	.26	.24	.10	.23	.14	.42	.23	.14	.21	.13	.09	.13	.05	.09	.30	.08	.08	.06
(13) Chassis	1.47			1.78	1.81	1.83	1.29	.98	.52	.73	1.15	.93	.81	.57	.38	.27	2.16	.66	.42	.85	1.00	.55	.47	.31
(14) Total Repairs	1.80	2.24	3.18	2.37	2.43	2.35	1.77	1.45	.69	1.21	1.53	1.70	1.27	.95	.89	.80	2.42	.96	.62	1.14	1.50	.91	.78	.52
(15) Grand Total	4.15	4.10	5.78	4.43	4.94	4.98	4.15	3.30	2.82	2.78	3.48	3.78	3.38	2.63	3.56	2.85	4.94	2.97	2.16	2.72	3.06	2.46	2.20	2.54

Operating Procedure

It should be mentioned at this point that the motor vehicle department and the operating department are units in themselves. The motor vehicle department gives the operating department a monthly statement of the

Standard Trailer Used for Terminal Transfer Service

costs of maintenance of all trucks used in each district. The operating department puts on its own chauffeur and helper and uses the vehicle for any service it may require. The city is divided into eight districts for operating purposes, each having its own supervisor who is responsible for all freight moved in and out of his district.

These districts are as follows:

District 1—Battery to 14th Street
District 2—15th Street to 28th Street
District 3—29th Street to 39th Street
District 4—40th Street to 125th Street
District 5—Above 125th Street to White Plains, including the Bronx
District 6—Long Island City
District 7—Jersey City, New Jersey
District 8—Terminal Transfer Service

The costs of moving freight in the districts are compared closely and a daily statement is presented to the general manager of vehicle service. This daily statement indicates the condition of each district so that immediate action may be taken if necessary. The statement is obtained by dividing the daily salaries, plus overtime, by the number of deliveries, plus the number of pick-ups. It has been found that the average of this cost per shipment in New York City is 16 cents in all districts. This figure may increase slightly during the slack periods, which are from Christmas to February 15, and from July 1 to August 15.

One-Ton Chassis with Special Body Developed by Motor Vehicle Department

As before mentioned, each driver on pick-up and delivery service has a helper and all new drivers are recruited from the ranks of the helpers as they are required. While the man is serving as a helper, he is learning, unconsciously perhaps, how to handle a truck. If a man stays as a helper too long, the company investigates to find out why he has not applied for a driver's rating. The helper must get his state license on his own initiative and must then be approved by the company's instructor. If he does not pass, he is asked to continue as a helper for a month or two, after which he can again be examined. The average length of service is 10 years.

The supervisor of each district brings the drivers and helpers together frequently for instruction on the operation of a motor truck and the correct methods of handling shipments. These instruction periods are always on the company's time and a short written examination is given at the end.

Table IV—Statement of Cost of Operation of Gasoline Motor Vehicles From July 1, 1929, to July 31, 1929 (One Month)

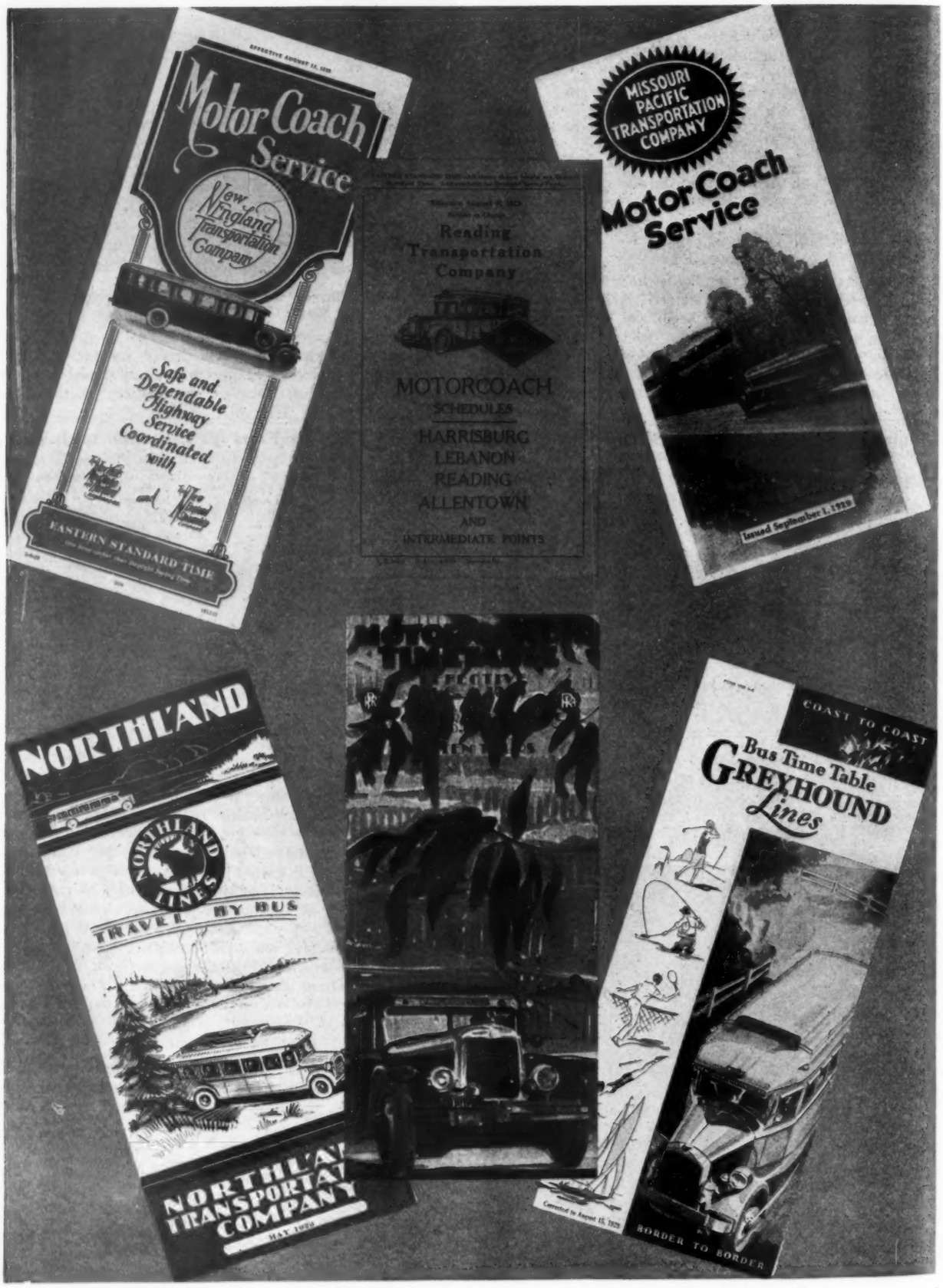
Motor Vehicles and Cost or Maintenance	New York Total	New York Per truck per day of service	Boston Total	Boston Per truck per day of service	Philadelphia Total	Philadelphia Per truck per day of service	Chicago Total	Chicago Per truck per day of service	Atlanta Total	Atlanta Per truck per day of service	San Francisco Total	San Francisco Per truck per day of service
(1) Number Owned	374	..	90	..	100	..	309	..	65	..	102	..
(2) Number in Service	..	..	..	..	..	..	..	..	..	..	..	..
(3) Days in Service	13,606	..	2,849	..	4,685	..	10,235	..	2,080	..	2,846	..
(4) Total Mileage	408,180	30	..	..	..	..	267,085	26	38,158	18	85,380	30
(5) Gasoline	$ 16,207	1.19	$2,466	.87	$4,220	.90	$10,055	.98	$1,392	.67	$1,342	.47
(6) Cylinder Oil	888	.06	..	..	284	.06	491	.05	133	.06	100	.03
(7) Garage Expenses	20,385	1.50	3,373	1.18	2,829	.61	13,618	1.33	1,579	.76	2,402	.85
(8) Total	37,480	2.75	5,839	2.05	7,333	1.57	24,164	2.36	3,104	1.49	3,844	1.35
(9) Repairs—Batteries	..	..			..	..	..	..	..	..	..	..
(10) Tires	2,138	.16			752	.16	1,646	.16	351	.17	68	.02
(11) Painting	..	..	6,874	2.41	1,078	.23	778	.08	183	.09	382	.13
(12) Body	7,778	.57			730	.15	2,317	.23	172	.08	324	.12
(13) Chassis	27,842	2.05			5,751	1.23	16,819	1.64	1,151	.55	337	.12
(14) Total Repairs	37,758	2.78	6,874	2.41	8,311	1.77	21,560	2.11	1,857	.89	1,111	.39
(15) Grand Total	75,238	5.53	12,713	4.46	15,644	3.34	45,724	4.47	4,961	2.38	4,955	1.74

Two-Ton Truck. Note Special Provision for Ventilation of Body

Rate of Depreciation

The Express Company sets up a yearly depreciation rate for each class of truck with a definite salvage value deducted from the first cost. If a truck exceeds its estimated life, it is carried on the books at its salvage value. Fords and Chevrolets are estimated to have a life of three years and a salvage value of $50. All other trucks costing up to $2,000 have a life of four years with a salvage value of $300.

Trucks costing between $2,000 and $3,000 have a life of five years and a salvage value of $450; between $3,000 and $4,000, a life of six years and a salvage value of $575. All trucks costing more than $4,000 are depreciated on the basis of an eight year life and a salvage value of $600.



Cover Designs of Some Representative Motor Coach Timetables

Preparing A Motor Coach Timetable

Railways adopt different plans in arrangement of folders—Unusual problems involved

MOST of the timetables issued by the railways covering the schedules of operation of their motor coach lines, possess a considerable degree of similarity to their railway timetables. However, there are points of difference due to certain factors connected with motor coach operation which are peculiar to that form of service and are not met with in railway service.

Comparatively few of the railways have yet established motor coach systems of sufficient size to warrant the publication of elaborate timetables devoted exclusively to their motor coach schedules. These and other railways include some, if not all, of their motor coach schedules in their ordinary railway timetables, particularly in instances where motor coaches have been substituted for train schedules which have been eliminated. Almost without exception, the railways show their motor coach schedules on particular lines in two-page or four-page leaflets, this perhaps being the most common type of timetable issued by the railway motor coach operating companies.

Arrangement of Schedules

In general, the railway motor coach timetables follow the style of railway timetables in the arrangement of their schedules. Thus they show in the first pages the schedules of the principal lines, grouping as near them as possible schedules of connecting branch lines. Some show schedules in both directions by the "Read down" and "Read up" method; others list the towns on each line in separate places, one in one direction and the other in the opposite direction, so that all the schedules "read down." Most of these schedules are given serial numbers in the usual way, although in the case of the Missouri Pacific Transportation Company, the identifying numbers of the various schedules are the numbers of the operating divisions. As a result, the schedules did not appear in serial number order. Other lines show schedule or table numbers in their station indexes, but arrange the schedules in serial number order so that there is no more difficulty in locating proper schedules than that encountered in locating schedules in railway timetables.

It should be noted, however, that in the case of the Missouri Pacific motor coach schedules, an index to motor coach lines is given as well as the index to stations, the line index indicating the page number in the folder on which the schedule of each line appears. This index to motor coach lines is printed on the page on which the station index begins, so that it is not really difficult for passengers to find the proper schedules provided they notice the index to the various motor coach lines. The line index lists the thirty or more motor coach lines operated by the Missouri Pacific Transportation Company, giving the mileages and the division numbers.

Distances and Fares

In the case of the six representative timetables considered in this article, there is little uniformity in the matter of publication of mileages and fares between various points. The New England Transportation Company, subsidiary of the New Haven, prints a distance table in miles adjacent to each schedule, and in the column next to the distance table, publishes the fares from the city where the motor coaches start their runs to the various towns and cities on the line.

The Reading Transportation Company likewise puts a table of distances adjacent to its motor coach schedules but indicates the one-way motor coach fares in a separate part of the timetable, stating such fares only between principal points.

The timetable of the Greyhound Lines, in which company the Pennsylvania is interested, shows distances between various points served by its motor coaches but not the fares charged.

The timetable of the Missouri Pacific Transportation Company shows the mileages to various flag-stop points, not indicated in the division timetables, in a special station index, the number of miles shown being the distance from the starting point of the motor coach operating to that particular flag-stop. Mileages to regular station stops are also shown in the usual way in the various schedules. Fares, however, are not shown in the Missouri Pacific timetables.

In the timetable of its subsidiary, the People's Rapid Transit Company, Pennsylvania shows mileages adjacent to the motor coach schedules. Fares to and from Philadelphia are shown in another part of the folder, in the index of the places served. Of the six timetables under consideration here, that of the Northland Transportation Company, subsidiary of the Great

Your Introduction to the Public

Usually, a motor coach line's first contact with prospective passengers is made through its timetable. Distributed widely, timetables are seen by many potential travelers long before the motor coaches whose schedules they contain are seen. Its timetable is frequently a motor coach line's introduction to the public.

It is essential, therefore, that timetables be prepared carefully, with an eye to simplicity and clearness of layout, as well as attractiveness of cover design. How several prominent motor coach lines affiliated with railways have prepared their timetables is described in this article.

Northern is the only one which shows neither mileages nor fares between various points. The Northland does, however, publish a partial list of round-trip fares in a special column of its folder.

The New England Transportation Company makes a particular point of showing connecting train schedules of its parent company, the New York, New Haven & Hartford. In many instances, through schedules are shown between principal points, including railroad schedules for part of the distance and motor coach schedules for the remainder of the trip.

Identifying the locations of their stations is handled in various ways by the motor coach operating companies. On the inside cover page of its folder, the New England Transportation Company lists the locations of the motor coach terminals in the principal cities and towns through which it operates. There appears to be no indication, however, of the location of ticket agencies or stopping points in the smaller towns and villages.

The People's Rapid Transit Company shows the location of some of its principal stations under the names of the cities in the schedules themselves. Additional ticket agencies and waiting rooms are shown in a separate column, but the street location of a number of the minor stations is not given.

The Greyhound Lines timetable shows the location of its ticket offices and waiting rooms in the station index, listing under each point of any size the location of Greyhound ticket offices in that place. An indication of the gigantic size of the Greyhound Lines motor coach system is the fact that seven pages in the timetable are devoted to its station index. The Northland Transportation Company does not give the location of any of its stations or waiting rooms, except in the largest cities, and the Missouri Pacific follows the same practice.

Intrastate Restrictions

The motor coach operating companies have adopted several interesting means of indicating intrastate points between which they do not carry local passengers, on account of lack of state operating certificates or for other reasons. The New England Transportation Company shows this information by including reference marks in its various schedules calling attention to restrictions in the "fare" column. In the fare columns, the fare is not shown, and stars are inserted in place of the usual fare figures opposite the names of those towns to which local passengers cannot be carried from the starting point of motor coaches operating on that schedule.

The Greyhound Lines show the various restrictions on their operations by means of footnotes at the bottom of pages containing schedules over restricted routes, attention to these footnotes being called by "dagger" symbols at the top of the columns. For example, on the Cleveland-Pittsburgh line, a number of its schedules are restricted, as indicated in a footnote reading:

"Intrastate schedules on which local stops will be made to pick up and discharge passenger within the State of Pennsylvania. No passengers may be picked up and discharged within the following zones: Pennsylvania—Ohio State Line, East Palestine and New Brighton; Beaver Falls and Ambridge; Ambridge and Sewickley; Emsworth and Pittsburgh. Passengers may, however, board coaches in one zone and be discharged in another zone."

Other schedules between Cleveland and Pittsburgh are marked with a solid black diamond reference mark, this indicating that the motor coach on that particular schedule carries interstate passengers only.

The Reading Transportation Company has a novel way of showing restrictions on its various schedules. In a column adjacent to its operating schedules, it shows local restrictions on the particular line involved. In this column, opposite the name of each station, is a letter symbol, these letters indicating that passengers will be received at such stations only for certain destinations. For example, on its Philadelphia-Reading schedule, the city of Norristown has the capital letter E opposite it in the restrictions column. This means that northbound passengers will be received at Norristown only for points beyond Pottstown. In the southbound schedule, Norristown is shown opposite the restrictive capital letter B, this indicating that passengers will be received at Norristown on southbound motor coaches only for points beyond Wissahickon.

Virtually all of the motor coach companies use the space in their timetables not required for their schedules to advertise features of their own services or to carry paid advertising. The leaflet of the Reading Transportation Company, showing its Philadelphia-Reading schedules, contains on the back page an advertisement of its motor coach service between Philadelphia, Atlantic City and Ocean City.

In various places in its timetable, the Missouri Pacific Transportation Company inserts advertisements of the comfort and convenience of its motor coach service, the carefulness and courtesy of its drivers, and urges travel by rail and motor coach to such points as the Hot Springs National Park, Ark., and the Rio Grande Valley in Texas. It also advertises that its motor coaches carry small packages on fast schedules, and promotes its special party service in chartered Missouri Pacific motor coaches.

The New England Transportation Company utilizes the inside cover of its system folder to advertise that it sells through motor coach tickets to any point in the United States. By means of cards inserted as fillers in many parts of its timetables, it advertises the dependability and safety of travel on its motor coaches, the facilities to be found in motor coach terminals, and its special party service. On one page, it also reproduces its "Operators' Safety Pledge." The current timetable of the New England Transportation Company also advertises the motor truck service it is now operating between industrial plants and manufacturing centers in southeastern Massachusetts and Rhode Island and the piers of the Providence line steamers operated by the New England Steamship Company, another New Haven subsidiary.

The Northland Transportation Company advertises special round-trip fares between certain principal points on its lines and also emphasizes the excellence of its equipment, and the advantages of travel by motor coach in saving both time and money. It also prints a number of maps of its own and affiliated lines.

The Greyhound Lines timetable contains a great deal of display advertising of its own motor coach services and of its Greyhound Van service for the movement of furniture and household goods. It also emphasizes the points of scenic interest on its various lines by means of advertisements of considerable size. The folder of the other motor coach operating company in which the Pennsylvania is interested, the People's Rapid Transit Company, not only contains considerable advertising of its own services, but also includes paid advertising. There are a number of hotel advertisements and on the inside cover page is a cigarette advertisement.

The accompanying illustration reproduces the cover pages of six railway motor coach timetables. These indicate the care which the railways have taken to produce timetables of a pleasing appearance, which will attract the attention of prospective passengers.

Forbids Truck Operation Without Certificate

Ohio commission calls service contracted for by New York Central illegal without permission to operate

A RAILROAD contracting for motor truck service to transport l.c.l. freight over the highways in co-ordination with its train service is a common carrier operating on the public highways and in order to carry on such operation must prove convenience and necessity for it and pay the required tax, "as applied in the case of any other person or corporation desiring to operate as a common carrier property for hire over such highways." This, in effect, was the decision of the Public Utilities Commission of Ohio in the case based upon the complaint of the Ohio Association of Commercial Haulers against the New York Central.

Issues of Case

The complaint was filed with the commission on March 28, and the hearing was held on June 5. The case involved the question of whether the New York Central is a common carrier motor transportation company and, as such, is lawfully operating motor trucks and trailers for the transportation of freight without first obtaining from the commission a certificate declaring that public convenience and necessity require such operation. The complaint centered about the contract of the New York Central with the A. B. Peek Company, under which the latter agreed to handle l.c.l. freight by motor truck for the railway between Cleveland, Ohio, and Toledo, and intermediate stations. The finding of the commission was that "the New York Central Railroad Company directly, or through the A. B. Peek Company, or any other agent not certificated by this commission be, and hereby they and each of them are, notified, directed and required forthwith to cease and desist from maintaining and operating or attempting to maintain and operate said unlawful motor transportation company service."

The findings of the Ohio commission in this case are abstracted below:

The respondent is a corporation engaged in the operation of a railroad. It accepts and transports freight for the public generally and indiscriminately as a common carrier. Since April 18, 1925, less than carload freight thus accepted by the respondent has been transported between certain points in Ohio in motor-propelled vehicles. Instead of transporting such less than carload freight by rail, this freight, between certain points in Ohio, is moved in motor-propelled vehicles over the public highways. Respondent does not have a certificate of public convenience and necessity for such operation and does not pay the special tax exacted by the state for such use of the highways.

Five motor vehicles and five trailers daily, and one additional motor vehicle and one additional trailer when required, are used between respondent's stations on its Norwalk division between Cleveland and Toledo, Ohio, both inclusive, and likewise between Toledo and Danbury, on its main line.

The respondent accepts such freight and transports it under its bill of lading and way bills, being the uniform bills of lading and way bills in general use by the respondent and other railroad companies.

The motor vehicles used in these operations are owned by the A. B. Peek Company and used in the transportation of this freight under and by virtue of the contract or contracts with the A. B. Peek Company.

In its decision the commission reproduces contracts and agreements existing between the New York Central and the A. B. Peek Company. One agreement signed by both parties reads as follows:

In connection with the proposed agreement to be entered into with your (the A. B. Peek Co.) company covering the trucking of l.c.l. freight between Cleveland and Toledo and intermediate stations, and as conditional to the making of such agreement, it must be understood that should the Railroad Company be compelled to terminate this contract or be prevented from any operation under such agreement or be compelled to discontinue such operation by reason of adverse legislation, litigation, or for any reason or cause beyond the control of the Railroad Company, then this agreement shall automatically cease and the Railroad Company shall not be held liable under any of the provisions hereof, or for such termination or for any claim for damages or otherwise on account thereof.

It is also understood that in no event shall the trucks of your company, while performing service for the Railroad Company, do transferring or hauling or perform any service for any other individual, firm or corporation.

Terms of Contract

The basic operating agreement of the railway and the contractor embodied the following terms:

FIRST: The railroad company shall deliver to the contractor, at such time as it may deem necessary, such less than car load freight at its various freight stations between and including Cleveland and Toledo, via the Norwalk division, as may be destined for delivery to various other freight stations between and including Cleveland and Toledo. The contractor shall furnish the necessary labor, tools, equipment and conveyances, and shall receive, carry, transfer and deliver the said freight between the said stations. Such transfer service shall be provided as and when required by the railroad company and it shall be performed safely, promptly and efficiently, and to the entire satisfaction of the superintendent of the railroad company, or his duly authorized representative.

Many railways, for purposes of economy or to facilitate operations, are handling l.c.l. freight over portions of their territory by motor truck, thereby eliminating certain way freight trains on their railway lines. Most of them do not own the trucks they use, but contract for them with established truck operators. Are the railways making such use of motor trucks for the transportation of freight, common carrier motor transportation companies, subject to the requirements as to operating certificates and taxes imposed upon other operators of motor trucks in common carrier freight service?

The Public Utilities Commission of Ohio says, "Yes". Its findings in a case involving the New York Central, the largest user of motor trucks in freight service, are reported in this article.

SECOND: The railroad company shall deliver, and the contractor shall receive, carry, transfer and deliver together with said freight such waybills or other forms of bills as may be necessary or incident to the transfer of said freight.

THIRD: Said transfer of freight bill shall be carefully checked by the contractor, as and when received by him from the railroad company, and any exceptions or objections to its condition shall be noted on the delivery receipt to be given by the contractor to the railroad company at that time. The form of such receipt shall be provided by the railroad company and shall be prepared and handled as follows:

The forwarding agent will prepare the "Statement of Freight Transported", form T-1418, in quadruple, the first copy to be signed by the contractor and retained by the forwarding agent as receipt for freight delivered. The other three copies with waybills attached are to be delivered to the contractor, who will deliver them to the receiving agent. The receiving agent will sign one copy and return it to the contractor as a receipt for freight delivered. The receiving agent will forward one copy to the superintendent and retain the third copy for file.

FOURTH: As full compensation for the transfer service to be performed hereunder, the railroad company shall pay the contractor a sum equivalent to fifteen (15) cents per cwt. based upon the weight shown upon said delivery receipt, with a guarantee of $30 per day, i.e. $25. per truck and $5. per trailer for the five regular trucks and four trailers used between Cleveland and Ohio; and from such receipts the railroad company will at the close of each 15-day period make up a statement of the amounts due the contractor hereunder, and shall pay the same to him within 30 days after the close of the month in which the same were earned. If more than one trailer is required, the railroad company shall pay the contractor $5. per day for each additional trailer used. If additional trucks are required, the railroad company shall pay the contractor $15. per day for each additional truck used.

FIFTH: The contractor shall be responsible for all loss of or damage to freight in his charge, or while being handled by him, and shall assume all liability for the payment of workmen's compensation or damages on account of injuries or death to his employes or to others, or damage to property, occurring by reason of the performance of the services required by this agreement; it being the intent of this agreement that the contractor shall be deemed independent and in no sense acting as the agent of the railroad company.

SIXTH: The contractor further agrees to deposit with the railroad company bond in a surety or bonding company, which shall be approved by the railroad company in the sum of $1,000 to secure the full and faithful performance of all the obligations of the contractor contained in this agreement.

SEVENTH: This agreement shall take effect on the 20th day of April, 1925, and shall continue in force until either of the parties hereto shall have given to the other party 30 days' written notice of its desire to terminate the same upon a date specified in said notice; but the railroad company shall have the right to terminate this agreement at any time in the event that the service to be performed hereunder shall in its judgment be deemed unsatisfactory. Subject to such termination, all of the covenants and agreements herein contained shall be binding upon and inure to the benefits of the heirs, executors, administrators and successors of the respective parties hereto; provided, however, that the contractor shall not assign or transfer the rights granted in him without the written consent of the railroad company.

Discussion by Commission

Following its reproduction of these agreements, the commission's decision says in part:

In accordance with the terms of the contracts, the railroad company determines the time at which the trucks shall run, the route over which they shall travel and generally supervises the operation of the trucks just as it would the operation of trains. The A. B. Peek Company, as provided in the contracts, does not haul any other freight.

All of the foregoing facts are not only clearly established by the record but may be said to be admitted by the respondent. Based on these facts the respondent contends: First, that the commission has no jurisdiction to entertain this matter or to make any order therein; second, that the respondent does not, by virtue of this fact, become a motor transportation company and that it is not required to have a certificate of public convenience and necessity or to pay the special tax in order to conduct its business on the public highways in the manner disclosed by the evidence.

The commission has give due consideration to the fact that Section 614-84, General Code, does contain the language relied upon by the respondent which specifically confers jurisdiction upon the commission to hear and determine a complaint alleging that a private contract carrier has become a common carrier, and to the fact that the operations in question have been conducted in the same manner from the start, and that whatever may be the status of the respondent the case does not involve any change from a private contract carrier to a common carrier. However, the commission cannot ignore other provisions of the same section which provide that the question whether or not any motor-propelled vehicle is being operated in such a manner as to make the operator thereof a motor transportation company subject to the regulations provided by the act is a question of fact upon which the finding of the commission shall be a final order reviewable by the Supreme Court.

If any further authority or procedure to hear and determine such a question is needed, it is found in other provisions of the General Code. The commission finds that it has jurisdiction to hear and determine this question and to make an order therein.

Railway a Motor Transportation Company

On the question of whether the respondent is a motor transportation company and as such is required to apply for and receive a certificate of public convenience and necessity and to pay the required tax before engaging in the business of transporting property over the public highway in motor-propelled vehicles, it should be kept in mind that the respondent here is the New York Central Railroad Company and not the A. B. Peek Company.

It is not a question of what the A. B. Peek Company is doing but of what the New York Central Railroad Company is doing. What the A. B. Peek Company might do by contracts with persons or corporations engaged in ordinary business is not a measure of what may be done by a common carrier. The controlling fact in this case is that the New York Central Railroad Company is a common carrier engaging in the transportation of property for hire and that it desires to and does transport a portion of the property delivered to it in motor-propelled vehicles over the public highways. We are unable to see why the New York Central Railroad Company has any more right to use the public highways for the conduct of its common carrier business thereon, without first proving convenience and necessity therefor and paying the required tax, than any other person or corporation who desires to operate as a common carrier of property for hire over such highways.

Otherwise, any person or corporation can advertise for and receive freight and merchandise from the public in general and make a private contract with a person or corporation to deliver the same and avoid the obligations contemplated by the law.

If the railway company can transfer this portion of its freight from its railroad tracks to the highways, we know of no reasons why all of its service cannot be transferred to the highways without any contribution by the user and without any control or regulation by this commission, and the public would be compelled to build and keep in repair the highways for their use.

So far as the contract or contracts between the A. B. Peek Company and the respondent are concerned, they speak for themselves. By these contracts the railroad company has secured to itself the exclusive use of those motor-propelled vehicles in its common carrier business. While it does not own the trucks and trailers, it does completely control their operation. It directs the property to be conveyed by them; it determines the times when and the routes over which the trucks shall travel; it retains complete supervision of their operation; the property transported is at all times under the control of the respondent; the transportation is a consummation of the contracts between the respondent and the shippers; the property is handled through the use of bills of lading and waybills exactly as any other freight which moves upon the respondent's road. In short, the respondent has made this truck operation a part of its common carrier business. In view of these facts the commission is not impressed by the statements in the contracts that the A. B. Peek Company is to be considered as an independent contractor. The A. B. Peek Company may be an independent contractor, operating over the highways only under a private contract, but the respondent is a common carrier for hire and is by virtue of this contract transporting property in motor-propelled vehicles over the public highways for hire as a common carrier.

The commission finds that the respondent is a corporation controlling and managing motor-propelled vehicles used in the business of transporting property as a common carrier for hire over the public highways in this state; and that as such it is a motor transportation company as defined by the act and within the inhibition of Section 614-87, General Code, that no motor transportation company shall begin to operate motor-propelled vehicles for the transportation of property for hire over the highways in this state without first obtaining from the Public Utilities Commission a certificate declaring that public convenience and necessity require such operation and paying the tax placed on such operation by Section 614-94, General Code.

Store-Door Service Proves Successful

Pacific Electric Motor Transport Company enjoys steady increase in business—How the company operates

By L. B. Young
Manager, Pacific Electric Motor Transport Company

IN March of this year, the Pacific Electric Motor Transport Company inaugurated, upon the lines of the Pacific Electric Railway, a co-ordinated truck-rail operation for the purpose of providing store-door freight service. The operation was described in the March 23rd *Motor Transport Section* of *Railway Age*. Since that time the innumerable inquiries received from all parts of the United States and from foreign countries, suggest a universal interest that justifies, after six months' operation, an account of the results that are being secured; and the tenor of some of the questions asked indicates a general misunderstanding that prompts a further exposition of the method of operation.

History of the Project

The Pacific Electric Railway is an interurban passenger and freight carrying road, 600 miles long, radiating throughout Southern California in all directions from Los Angeles, and serving, together with scores of lesser communities, 55 cities and towns of sufficient size and importance to justify the maintaining of freight agency stations. Into this great consuming territory, vast quantities of staple commodities and general merchandise are distributed daily from metropolitan Los Angeles. At one time practically all of this traffic was hauled by railroad; but with the advent of efficient motor equipment and extensive net works of concrete highways, a large part of it has been lost to motor trucks.

The result of this diversion of traffic is that the Pacific Electric Railway, to say nothing of having lost a very lucrative business, is left with freight stations and facilities which are used to only a part of their potential capacity. In many cases station forces, though already at a minimum below which no further reduction can be made, still can absorb without any additional expense, several times the volume of l.c.l. tonnage now being handled. The same is true of freight cars and freight trains.

From a situation of this kind there are two possible sources of relief. The first is for the railroad itself to put trucks upon the highways and divert what little l.c.l. it has left to that mode of transportation, thereby making possible the discontinuance of entire merchandise trains, and effecting considerable savings in operating expenses. This, however, is not a practicable solution for the Pacific Electric, because, with its limited number of freight trains, none could be discontinued. The alternative is for the railroad to recover from truck competitors a sufficient share of the traffic that has been lost to them to provide a full load for its partly used rail facilities and forces. It is this latter plan that the Pacific Electric has adopted.

Within the territory served by the Pacific Electric, it is carefully calculated that more than half a million tons of merchandise moves annually by motor truck. This traffic is attracted to the trucks by two prime factors:

1. Trucks offer complete service from store-door to store-door.
2. Truck merchandise rates from store-door to store-door are lower than the combination of depot to depot rail rates, plus drayage.

The Pacific Electric believed that a fair share of this traffic could be diverted from the trucks back to the railroads by a co-ordinated rail-truck service that would offer these same two attractions. For that purpose the Pacific Electric Motor Transport Company was organized. The Transport Company, although entirely independently operated, belongs to the Pacific Electric through stock ownership.

Method of Operation

The customary method of hauling l.c.l. merchandise freight by truck is generally this: At a major point of origin, such as Los Angeles, small trucks ranging in capacity usually from one ton to three tons, operate throughout the day picking up freight at the warehouses of various shippers and hauling it to the truck carriers' freight depots. For this pick-up work, some truck carriers own and operate their own trucks; other contract for the work to be done by regularly organized operators of pick-up service. For example, the Signal Trucking Service which performs Pacific Electric Motor Transport Company's pick-up and delivery work in Los Angeles, before undertaking the Transport Company's contract, performed identical service for a group of about thirteen franchised truck carriers operating out of Los Angeles. At the truck carriers' depots at point of origin, the day's accumulation of freight is set up on the freight platform, and there loaded into large trucks and trailers for the line haul.

Delivery is accomplished by two methods: At smaller intermediate points, shipments largely are peddled to consignees directly from line-haul trucks; but at larger terminals, it is worked out of the line haul trucks, set up in the freight house, and again loaded into small trucks for delivery to consignees.

The Pacific Electric Motor Transport Company operates in exactly the same manner, with these exceptions: Instead of using large motor trucks and trailers for the line haul, it uses rail cars. Being a rail car instead of a truck, the line haul vehicle, of course, does no peddling directly to consignees' doors; all freight, even at smaller points, is transferred through the freight depot to small trucks for delivery.

The Transport Company's use of rail cars for its line haul has created in the minds of many who have written to inquire about the service, some very obvious confusion as to the part the Pacific Electric Railway

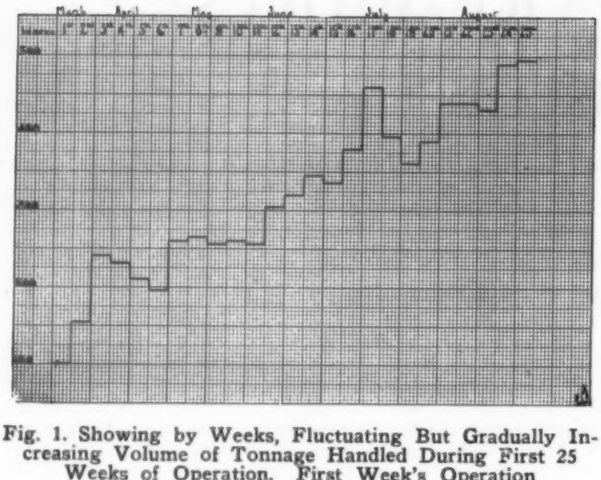


Fig. 1. Showing by Weeks, Fluctuating But Gradually Increasing Volume of Tonnage Handled During First 25 Weeks of Operation. First Week's Operation Used as Index 100

plays in the operation. To get a clear picture of the operation, these points should be borne in mind: So far as the public is concerned the railroad does not enter into the Transport Company's operations at all. The fact that the Transport Company elects to hire a railroad to make its line haul, instead of buying trucks for that purpose, is of no interest to the patron. The Transport Company, a common carrier express company, holds itself out to perform a complete service from store-door to store-door; it issues bills of lading and publishes rates to cover this entire service. The railroad is not a party to these rates; it gets its compensation under a private contract from the Transport Company—not from the public.

Though its status is that of an express company, the Transport Company does not compete for the class of traffic of the nature generally carried by an express company. What the Transport Company, is after is freight, and the traffic it is getting is the heavier class of merchandise customarily hauled by the highway truck carrier.

One of the most serious factors with which a railroad is confronted, when going into the trucking business, is the enormous investment in motor equipment usually involved in the change over from the old to the new, or co-ordinated, mode of transportation. To the Pacific Electric Motor Transport Company, this has not been a problem. One of the chief merits of its plan of operation is that it makes use of properties—motor trucks, cars, stations—that already are owned or available, but only partly used.

No investment whatever has been required in the Transport Company's operation. Ample money was appropriated with which to buy motor trucks for pick-up and delivery service, but this was found to be unnecessary. The local draymen in various towns found themselves confronted, just as the railroad was, with partly used equipment because of the diminishing volume of rail-hauled l.c.l freight to be delivered; and, in every one of the 44 points served, the Transport Company succeeded in contracting with these draymen, at reasonable rates, for pick-up and delivery work. Thus, the entire service—pick-up, line haul and delivery—is accomplished, not by making new investments, but by providing greater use for investments already made.

These contracts with local draymen in the towns served, in addition to saving an investment in trucks, have one other important merit. Every drayman is a solicitor for the Transport Company. It is likely that he is a substantial business man, active in the service clubs and civic affairs of his community, and his contact with other business men of the town gives him, as compared with the highway carrier who merely passes through, a distinct advantage in soliciting traffic.

Practices Different from Those of Railroad

Surprisingly different from those prevailing in the railroad business are some of the practices disclosed by six months' experience in the operation of this new service. For one thing, a different character of competition has to be met. Rail rates between given points usually are the same over all available routes, and there is little incentive for a shipper by rail to change from one road to another. But the so-called "private" truck operator, not being subject to regulation, can charge what he pleases, and, consequently, for the shipper by trucks there is always the chance for a bargain rate. Bargaining for business, of course, is something which the Transport Company, being a common carrier, with its tariffs duly filed, cannot do; consequently, a patron of today may be gone tomorrow, and the most persistent solicitation, on the basis of reliability and superior service, must be kept up if a fair share of the traffic is to be secured in the face of this sort of competition.

Personal accommodations held out by truck operators have in many cases grown until they have become definitely established practices, which the Transport Company has been obliged to meet. Chief among these is the "C.O.D." shipment, as distinguished from the "Shipper's Order" in common use on railroads. The average shipper looks upon the "C.O.D. privilege as an indispensable part of the service, and it is not uncommon for the Transport Company's C.O.D. collections to exceed its gross revenue. For this service a published charge is made, and a very attractive revenue is derived from it.

Another wide departure from the practice prevailing on railroads is the granting of credit up to thirty days on freight charges. This is a privilege granted to patrons who are recommended by local agents of the Transport Company, and approved by the treasurer. The privilege is requested mostly by the small town merchant who wants to settle once a month and whose bills seldom are very large. There have been no losses.

Having, through experience, grown accustomed to the usual 4:30 P. M. closing hour of railroad freight stations, most shippers have adopted the practice of giving first attention to getting out whatever orders they have for rail shipment, leaving until the last, truck shipments which will be received or called for by truck

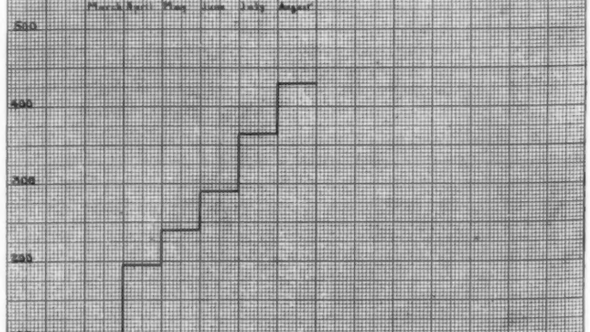


Fig. 2. Showing by Months, the Constantly Increasing Volume of Tonnage Handled, Using March Operations as Index 100

carriers up until a much later hour. To meet this situation, the Transport Company has found it necessary to keep its Los Angeles depot open until 6 P.M. for the receipt of shipments brought to the depot by the shipper, and until as late as 7 P.M. to receive the Transport Company's own trucks arriving late with "pick-ups." The practice of making late delivery to truck carriers has grown until in many cases shippers will not allow pick-up trucks into their platforms until after 4:00 P.M. when all rail shipments have departed, and the most desirable hour for pick-ups, from the shipper's point of view, is around 5 o'clock. This, of course, places a very high peak load on the pick-up department.

It might be mentioned at this point that, although pick-up service is held out to the shipper, in many cases he prefers to bring shipments to the depot with his own trucks rather than have a completed order congesting his crowded warehouse floor while awaiting a pick-up truck. For this class of shipper a separate scale of "Depot to Store-door" rates is published, 2½ cents under the "store-door to store-door" rates thus allowing the shipper something for the use of his truck and at the same time providing store-door service for his patron at point of destination.

Billing Time Saved

Among retail merchants there is a growing tendency toward short stock buying. As a result usually they are in a hurry for their goods, and early morning delivery is imperative. As a general rule the Transport Company's delivery trucks are loaded and on the street making deliveries at 7 A.M. To facilitate this early delivery, the common railroad practice of making out freight bills at destination station has been abandoned in favor of a multi-part, combination waybill—freight bill—truckman's receipt—delivery receipt and station record, which is made out by the forwarding agent and accompanies the shipment. Thus, all necessary billing documents are ready for the delivery truckman immediately on arrival of the freight at destination.

The freight bill portion of this document, however, remains with the station agent who does the collecting either on the first of the month or, in the case of patrons not on the credit list, the same day. The truck driver does no collecting, except where a C.O.D. is involved. The demurrage on the truck would be too great. Goods are seldom received by the same man who has access to the cash, or the authority to draw a check, and to attempt to collect at the time of delivery would result in prohibitive delay to truck and driver.

Because of short stocks and day-by-day buying, late delivery or astray shipments in many cases might seriously affect a merchant's business for the day, and for this reason the straightening out by the slow process of correspondence of over, short or astray shipments is intolerable. This is a telephone job in every case. And usually by nine o'clock in the morning a damaged shipment or a shortage i well on the way to correction, either by the shipper duplicating the order, or by special service to get astray freight to its proper destination. These cases are not too frequent; but they typify the demand for personal service which the Transport Company has been obliged to meet.

The Transport Company, like practically all franchised truck carriers in the territory, is governed by "Monroe's Ship-by-Truck" freight classification. This is a very thorough publication ideally adapted to its purpose. It is now in course of re-issue and will contain all the items in the Consolidated Classification and many other items. Its chief point of difference from the Consolidated Classification is in its description of the items and in its packing rules. Having in mind that its packing rules are much less exacting than those imposed by railroads, it is rather remarkable that the Transport Company's payments for loss and damage during the first four months' operation averaged less than four tenths of one percent of gross revenue.

Designed primarily to secure a fair share of the tonnage that has been lost to truck carriers, the Transport Company, in its first six months of operation has fully met this expectation. A careful watch of the business during that period clearly shows that the Transport Company has not taken away from the railroad any tonnage that the railroad already enjoyed. Practically, every pound of it can be definitely identified as new business that had previously moved by motor truck.

The increased volume of tonnage brought to the railroad by the Transport Company has resulted in but little extra expense for handling. At only three stations has it been necessary to employ extra help because of the Transport Company's operation; and at Los Angeles, the station at which practically all traffic originates, there has been no extra expense for handling. The entire added volume, amounting, so far, to an increase of about 12 per cent over the railroad's l.c.l. tonnage, has been absorbed by existing platform forces, with the result that the railroad's average cost per ton of handling at Los Angeles has been reduced about 18 per cent. There still is room to absorb a much greater increase before additional expense will be necessary.

The Transport Company serves largely a territory which a great many residents leave during the summer vacation months, and during June, July and August a decrease in business is normally to be expected. In spite of this fact, however, the Transport Company has enjoyed, from the day it started operation, a constant increase each month over the preceding one.

Steady Increase in Business

Figure 1 compares the business done by weeks since the operation was commenced. From this chart the true scale has been omitted, as its purpose is merely to show that although the day to day fluctuations are in some instances quite wide, the general tendency is consistently upward. Figure 2 shows results by months, and it will be noted that the increase in both tonnage and revenue is constant.

The gross revenue from operations of the Transport Company on the lines of the Pacific Electric will never be so great as it would from similar operations on a trunk line road, for the reason that all hauls on the lines of the Pacific Electric are necessarily short and rates are correspondingly low. However, the Transport Company is making money. At the end of the first three months of operation, all preliminary and organization expenses had been paid, and the company has made a profit ever since.

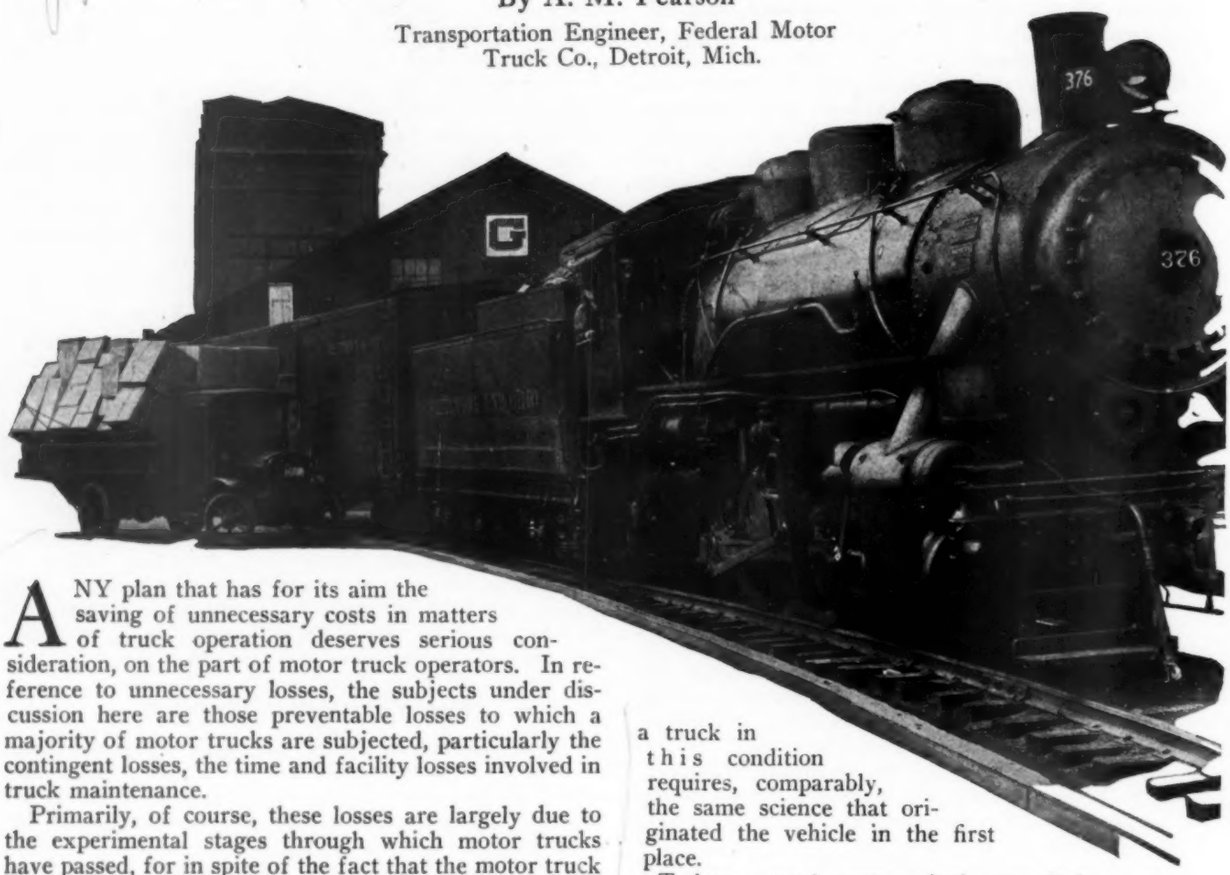
The service is popular. This is especially so with the larger shippers, who prefer to patronize a reliable organization that observes the regulations of the railroad commission and whose rates and rules and practices are consistently the same at all times. The Transport Company commenced operation with 24 stations. Since then 23 additional points have been added, and further important extensions are now being considered. All of these extensions have been made in response to urgent requests of shippers.

Possibly the ultimate success of this new type of coordinated rail-truck operation may be more reliably indicated by this popular demand for its expansion, rather than by the immediate profits being made from it.

Preventive Maintenance and Motor Truck Operation

By A. M. Pearson

Transportation Engineer, Federal Motor Truck Co., Detroit, Mich.



ANY plan that has for its aim the saving of unnecessary costs in matters of truck operation deserves serious consideration, on the part of motor truck operators. In reference to unnecessary losses, the subjects under discussion here are those preventable losses to which a majority of motor trucks are subjected, particularly the contingent losses, the time and facility losses involved in truck maintenance.

Primarily, of course, these losses are largely due to the experimental stages through which motor trucks have passed, for in spite of the fact that the motor truck has been with us now for nearly a quarter of a century, it is seemingly more or less of an unknown quantity. There is a possible explanation of this in the fact that the original idea concerning the truck was that it was something with which to "replace" the horse. Not until within the last few years have we become conscious of the basic idea that the truck is a highly engineered transportation entity.

The last ten years has seen many mechanical refinements made on motor trucks. This has been due to the constantly increasing demand for speed. Engineering genius has met every change, and they have been many, and has created the necessary efficiencies demanded by speed in power, braking, etc.; but in maintenance we are still rudimentary, we are still "repairing" trucks. We do not appreciate that the truck is a precision tool, built on close measurements, and that its maintenance must, to be correct, follow the same scientific principles.

What Is Maintenance?

Motor truck maintenance is the art of holding or keeping a truck as nearly as possible in its original state. It is obvious, therefore, that if maintenance fills the duties of its office it must keep the truck in a condition comparable to a new truck as a basis, and that to keep a truck in this condition requires, comparably, the same science that originated the vehicle in the first place.

To keep a truck comparatively new all the time, then, means to prevent maintenance demands rather than to repair something after a failure has occurred—to provide for "preventive maintenance" rather than "repair maintenance."

There was a time a few years back when business only called in legal advice when it got into trouble. Today the principal function of legal counsel is not to win cases in court, but to prevent business from making unwise moves. The same condition is the modern idea in truck maintenance. The reason that preventive maintenance has come so prominently to the front in the past three years is the fact that truck operators have suddenly awakened to the knowledge that truck operation is directly related to traffic development.

The real power that moves goods comes from the shipper. In the final analysis, the shipper pays all the bills and provides the dividends. When a merchant puts in his store fixtures, for instance, he may think he is satisfying his own ideas, but what he is really trying to do is to satisfy the customer—make sales. By the same token, when anyone in the transportation business buys motor trucks, he may be under the impression that he is purchasing equipment to meet his conception of moving merchandise, but what he is actually doing is to secure

something which will satisfy the shipper for whom he is moving the goods.

The Shipper Controls

Contrary to any other notion, sales govern all business movements. The shipper, in the last analysis, dictates the type of truck, its speed, its dispatching, routing, every possible phase of truck purchase and operation involved in distribution. Generally speaking, road failures are the things to watch most closely because road failures are indications of the condition of the equipment, and road failures are what upset the customer most. To please the customer, the equipment should give an uninterrupted, speedy, safe flow of transportation and to please the operator this flow should be economical. This is where "preventive maintenance" comes into the distribution picture, because preventive maintenance is the chief factor in continuous, uninterrupted transportation flow.

Preventive maintenance is simply knowing what to do and doing those things. If we intend to do anything, the principal movement is to make a start. So in preventive maintenance, the start is made with consideration of three elements—speed, safety and economy. Maintenance problems which are comparatively simple where low speed is involved, become extremely difficult when increased velocity must be taken into consideration. At high speed, irregularities which are practically unnoticed at, say, 20 miles, result, at 50 miles an hour, in shock stresses of such intensity as to cause extreme damage. This is due to the fact that the impact or intensity of the blow of a moving body increases as the square of its velocity.

So it is with fatigue, since metals are subject to fatigue they can be worn or damaged internally long before showing any signs of strain on the surface. This the maintenance of a truck must anticipate as far as possible, especially where overloading is part of the transportation program.

Only a minority of users of motor trucks realize that maintenance is the most important item in the schedule of operating costs. Far too many, even among experienced users, relegate it to an inferior position. They fail, apparently, to realize that the measure of the efficiency of a motor vehicle is the proportion of its time spent upon the road; that a formula for that efficiency is days in use divided by days of life.

Maintenance A Double Expense

Now maintenance is a double expense: the positive expense of effecting the maintenance itself, and the negative expense measured by the loss of the vehicle's use. It all comes back to one fundamental condition which motor truck users should always have in mind, whether they be adding to their fleets, buying spares and renewals for existing machines, or arranging to have their vehicles overhauled or repaired. That fundamental condition is that the best is cheapest in the long run.

Any expenditure in reason is worth while if it tends to reduce the cost of maintenance and, what is more important, the time lost because of the necessity of tying up the vehicle for maintenance. It is best to buy good machines in the first place, it pays to buy genuine and first-class spare parts; and it pays to be thorough in the execution of repairs, to the end that the vehicle may spend its maximum time on the road and render the most effective service.

When the purchase of a truck is considered, it is evident that while a motor truck is delivered, what is actually bought is so many miles of transportation, and the type of this transportation should be a subject for the most careful thought. This, then, brings the matter down to the consideration of that which constitutes the "type of transportation". These are the three elements: speed, safety and economy.

When we purchase for speed, safety and economy, we must endeavor to keep those three elements in the percentage of normal operation that existed in the new truck. Every specification of a truck finds its place under one or more of these factors. Speed must be present to conserve time; safety must be present to insure complete delivery of merchandise; and economy must be present to reduce the cost of unit distribution. The absence of any one of these elements will endanger the performance ability of the vehicle.

The purchase of motor truck transport equipment demands the same kind of serious consideration that is given to the purchase of locomotives, machinery, or any other mechanical units. If the buyer is not prepared to undertake expert analysis, he should have one made. When the facts are before him, he will be in a position to choose wisely and profitably.

Motor truck transportation is a science and, as such, is just as important as any other form of transportation. The purchaser should select equipment that will give full dollar value by harmonizing with conditions peculiar to the service under which it is to perform. Purchasing blindly or by pure dollar economy is most dangerous. Operation and maintenance costs are much greater over a period of time than the amount of the original purchase outlay.

Cost Accounting Practice

In the cost accounting of preventive maintenance, there is a radical departure from the old-fashioned methods involved in connection with curative maintenance. Under a properly organized preventive maintenance plan, all costs are prepaid, in much the same way that insurance is prepaid. The old plan was to charge the costs as they occurred. This is very inefficient be-

Federal Motor Trucks Operated by Blue Line Transfer for the Baltimore & Ohio

cause it makes for peaks and valleys in the distribution of costs. Under such a system, no provision is made in advance for the upward curve of maintenance costs, as the age of the truck advances. Also there is no provision for the equalized distribution of sudden large cost items, which must either be charged to one month's maintenance or divided arbitrarily over several months.

Under a plan of preventive maintenance, the accountant sets up a daily budget of maintenance costs, based on past experience tables, and charges this budget to maintenance each day. This charge is then transferred to a cumulative reserve for maintenance, and as each expense item appears it is charged to this reserve. The result is very clear. Starting, for instance, with a new truck, the maintenance costs are very low for the first twenty thousand miles, then the cost curve begins to rise and becomes higher as the mileage accumulates. But in the meantime, the maintenance reserve has been growing and when these greater costs arrive or emergencies occur, the truck has already earned and laid aside the money to care for them.

Another very important function of the accounting department in preventive maintenance is to produce statistics to aid the management. Suppose, for example, that the gasoline cost is 50 cents per day more than the budget allotment for fuel. This may be due to a bad carburetor condition. Caught by checking, it may be corrected with only one or two days' loss. Under the old method, it might accumulate a month's loss of $15 before it was discovered. Again, under the old system, a truck might spend a week in the shop, six days of idle wheelage time thrust against the truck in one lump. By preventive maintenance, not only would this idle time be greatly reduced, but such idle time as occurred would be spread over a long period in small time elements that would cause little or no interference with truck service.

The mechanical efficiency of a motor truck begins with the design and manufacture of the vehicle. Both design and manufacturing are based on mathematics, the employment of various precise measurements. Therefore, maintenance is simply a matter of movements, and movements can only be expressed in figures and units of measurement: minutes, cents, etc. The management must get these measurements if it is to produce mechanical efficiency and continuous service.

More Mathematics In Maintenance

Generally speaking, there has never been enough mathematics in maintenance. It has had too much of the aspect of trial and error. The inclination has been to base maintenance on opinions rather than facts, with a constant confusion occurring from such control or lack of control. Preventive maintenance takes practically all of the guesswork out of the maintenance operation, and produces mechanical efficiency automatically. It does this because it bases its movements on actualities and not on a lot of averages that are illusive and have no permanency upon which to base control.

This article has been largely devoted to preventive maintenance as the main dependence of mechanical efficiency. There is, however, another side to the subject at hand. First of all, the maintenance of mechanical efficiency does not relate exclusively nor depend entirely on the mechanical movements which take place in the shop. As a matter of fact, that is only a small part and the easiest part of mechanical efficiency for which to provide. Mechanical efficiency relates to the results of performance ability, guided by the management.

Suppose an operator should take one of his trucks, turn the switch, start the motor, put the transmission into gear and throw in the clutch; this would all be management. Now suppose that when he had done all these things, he should jump off the truck. What would happen? It is perfectly obvious that the truck, being self-contained in its movements, would wander around, subject to its own mechanical inclinations, until someone or something stopped it.

To operate properly, to go where it is intended to go, the truck must have someone at the steering wheel. Preventive maintenance, properly managed, is the man at the steering wheel in mechanical efficiency. The motor truck of itself can do nothing; it is only a highly organized piece of machinery. Its mechanical efficiency is completely dependent upon management. The better the management, the more perfect the efficiency.

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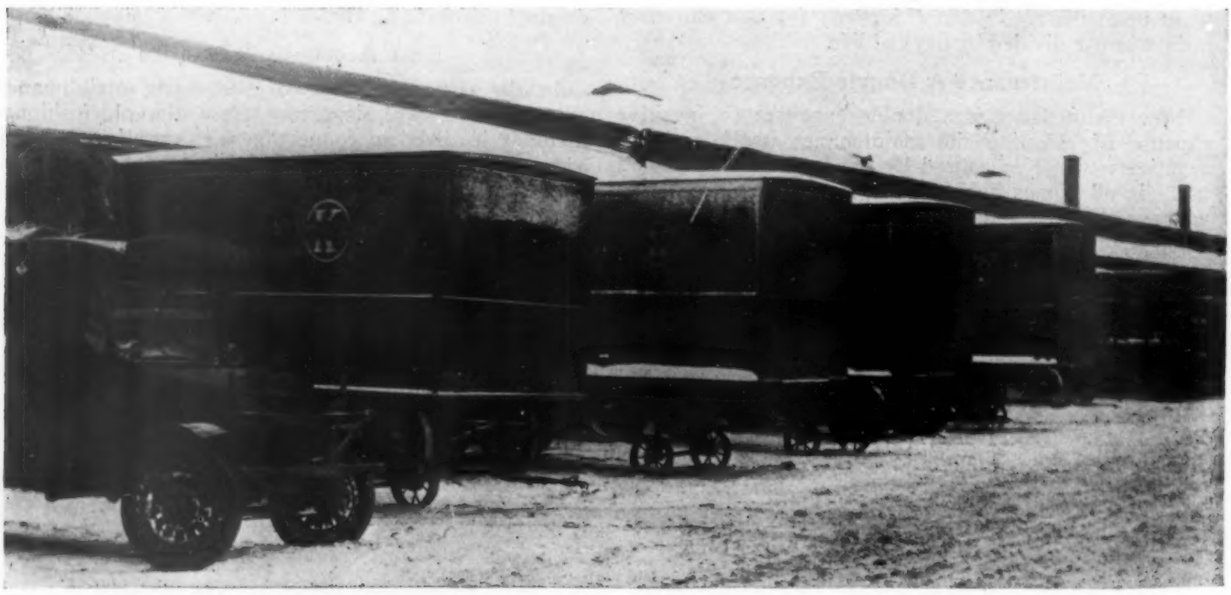
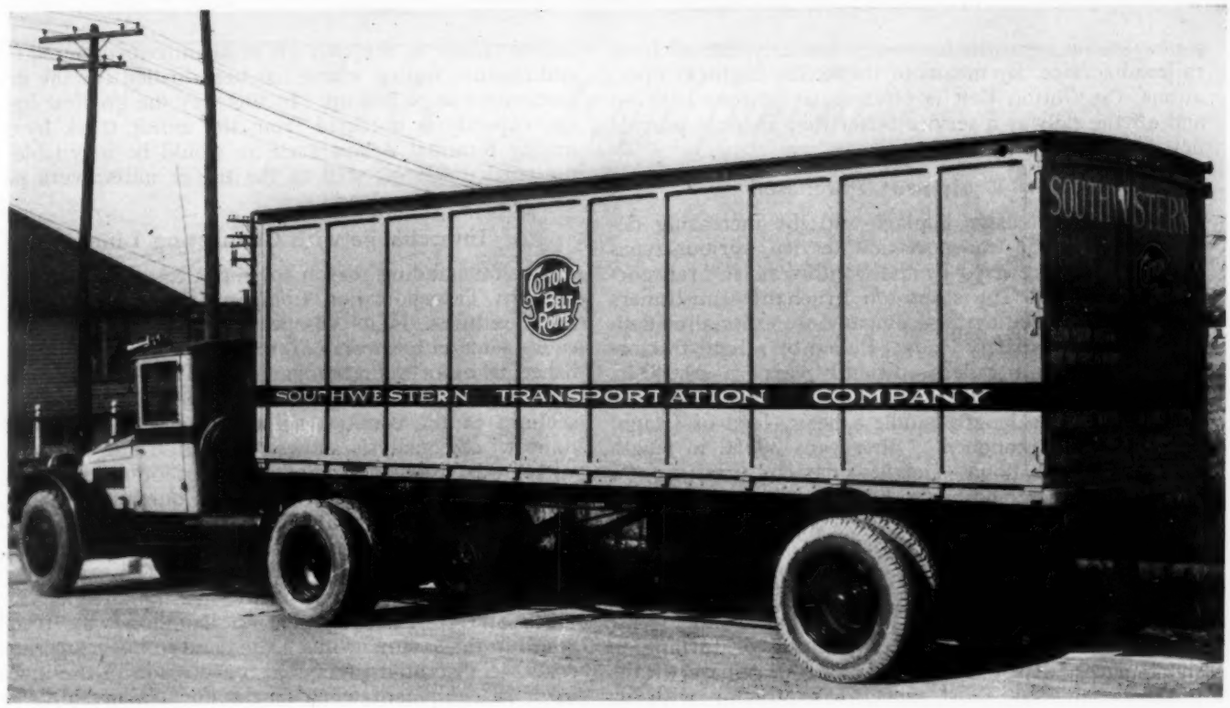


Trailers Lined Up for Loading at Carroll Street Freight Station of New York Central at Buffalo



Fruehauf Semi-Trailer and White Tractor in Southwestern Transportation Company Service

Lower Costs, Better Service
With Trucks and Trailers

Southwestern Transportation Company insures success by installing equipment which effects savings in time and expense

By C. L. Schneider
Transportation Engineer, Fruehauf Trailer Company, Detroit, Mich.

THE Southwestern Transportation Company, motor coach and truck operating subsidiary of the Cotton Belt, has made numerous additions to its fleet of trucking equipment to meet the rapidly increasing transportation demands of manufacturers and shippers throughout the territory it serves in the southwest. The recent purchase of tractor-trucks and semi-trailers by this company is a further step in the development of a comprehensive fleet of equipment to handle freight over the highways as an adjunct of the parent railway. At the present time, the company is operating 33 motor trucks, 2 tractors, 8 trailers and 2 semi-trailers, over a total of 1,333 miles of highway routes and in 8 terminals.

The Southwestern Transportation Company covers extensive routes in Texas and Arkansas from its headquarters in Texarkana. Working parallel to the lines of the railroad, the motor equipment brings the shippers and the railroad in closer contact, especially in outlying districts where towns are located away from the railroad right-of-way.

Reducing Operating Expenses

In this district, the railroad has been faced with the necessity of making material reductions in operating expenses, especially on short hauls. Freight shipments between nearby cities scarcely paid expenses. This was still true when the service was cut to only a few local freight trains per week. An important ally was found in motor transportation. The limited crew of a motor truck alone makes a substantial saving. A trailer is usually pulled behind the truck, which doubles the load but does not add to the size of the crew. Daily haulage is made if required, which results, of course, in better service.

When used as "feeders" to the railroad from small towns lying at some distance from the railway line, the use of motor equipment facilitates shipping and means

a new business growth for towns formerly cut off from railroad service. By means of its flexible highway operations, the Cotton Belt is offering its patrons both on and off the railway a service better than it could provide before.

New Equipment Purchased

Owing to extensive haulage and the increasing demands for motor transportation service, various types of equipment are used by the Southwestern Transportation Company. The seven-ton Fruehauf semi-trailers recently purchased by this company are especially adapted for heavy capacity loads. Pulled by a light tractor-truck, these semi-trailers efficiently carry a 20,000-lb. gross pay load.

Vans 20 ft. in length handle a heavy load of freight with ease and economy. Other vans 30 ft. in length are used for "balloon" freight—that is, furniture and other bulky commodities. Loads such as these are handled with facility in the large cargo compartments of the trailers.

The flexibility of semi-trailers insures ease of manipulation under all conditions, which gives special advantages in loading and speeds freight handling to the utmost. Turning sharp corners, backing or turning in short places, depend directly on the wheelbase of the tractive unit. A short wheel base tractor with its swiveling fifth-wheel is like a long wheel base motor truck with a universal joint in its frame. A semi-trailer unit can be turned in approximately its own length, and can be "jackknifed" with ease into small places for loading which a long wheel base motor truck would have more trouble in approaching.

These semi-trailers are equipped with dual pneumatic tires and air brakes, providing the same safety measure used by the railroads. Full automatic supports on the trailer are an extra safety precaution. Uncoupling is impossible unless brakes are set and the supports are down.

When freight loads run lighter, a straight motor truck is sometimes used. One or more 5-ton, 4-wheel trailers pulled behind the truck double and triple its load-moving ability. If extra stops are to be made, a loaded trailer is dropped off at an intermediate station and another trailer, which has been loaded for the next destination is picked up. In this way the greatest haulage capacity is obtained from the motor truck by reducing terminal delays such as would be inevitable if the truck itself, as well as the trailer units, were held for loading and unloading.

Interchange with Connecting Lines

One outstanding reason for the success of the Southwestern Transportation Company in its operations in the Southwest is its co-operation and interchange of equipment with several of the other large, well-established transportation companies in Texas. By exchanging freight with haulage operators working in different sections of the country, shipments are speeded to the utmost. An analysis showed that the same type fifth-wheel was used on tractor-trucks of other companies. Loaded semi-trailers are, therefore, quickly exchanged. The same quick exchange is also made with four-wheel trailers which are coupled by a standard, government-type pintle hook.

In all of these trucking operations, the advantages of truck and trailer equipment in handling way freight result in the saving of much time and in lower operating costs. Substantial savings also are made in the investment in equipment when trucks and trailers are used. Trailers parked "dead" at different terminals for loading and unloading cut costs and eliminate idle time for the motor equipment. The elimination of the handling of small packages on the steam line increases the facilities for handling car load shipments, a situation which results in advantages both to the railroad and its shipper.

The success of the Southwestern Transportation Company in the Southwest is comparable to that noted in other parts of the country where motor transportation is co-operating with railroads. In the eastern and central sections, as well as in the South, the plan has had wide usage and has effected substantial savings of operating costs for railroads, as well as savings for shippers in time required to complete the delivery of their shipments.

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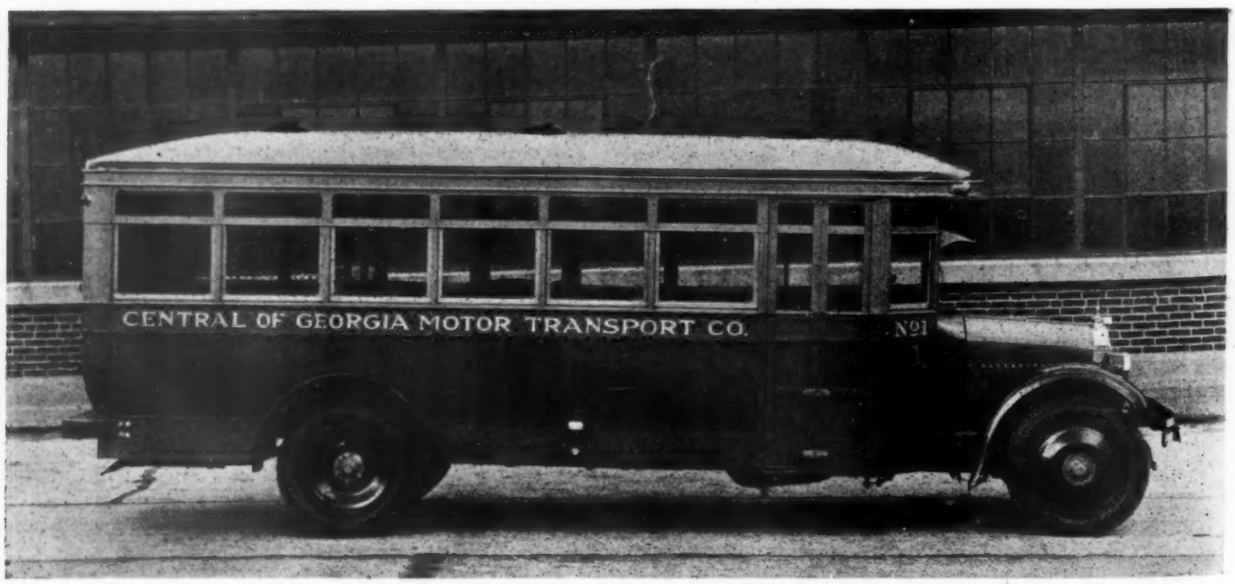


Motor Coach with Baggage Compartment in Service of Central of Georgia

New Equipment

Twin Coach Introduces 21-Passenger Model

THE Twin Coach Corporation, Kent, Ohio, has recently announced a 21-passenger, urban-type motor coach with unusual capacity for its length and weight. It is designed for use where heavy traffic conditions require a vehicle of exceptional maneuverability, combined with facilities for quick entrance and exit and a maximum rush-hour capacity. The coach will turn within a radius of 24 ft. and has an overall length, including bumpers, of 20½ ft.

The body and mechanical units are carried on specially designed main frame cross-members and are assembled so that they are interdependent for support. These cross-members are specially formed and are trussed to the main body rails so as to give a semi-flexible construction to better withstand unusual road shocks without concentrating strains or stresses at any one indeterminate point. The upper and lower body sections are completely built of Plymetl and riveted to body T-posts. All joints are riveted and welded. The body posts are made of T-irons, $\frac{3}{16}$-inch thick, and curved at the upper end to conform to the roof lines.

The flooring is made of ¾-inch, 7-ply laminated fir plywood, which is specially treated for protection against moisture and is laid in a sealing compound to eliminate squeaking at the joints. The flooring is covered with $\frac{3}{16}$-inch brown linoleum. The center section of the roof is made of Plymetl, ¼-inch thick and the curved sides and ends are covered with 18-gauge steel.

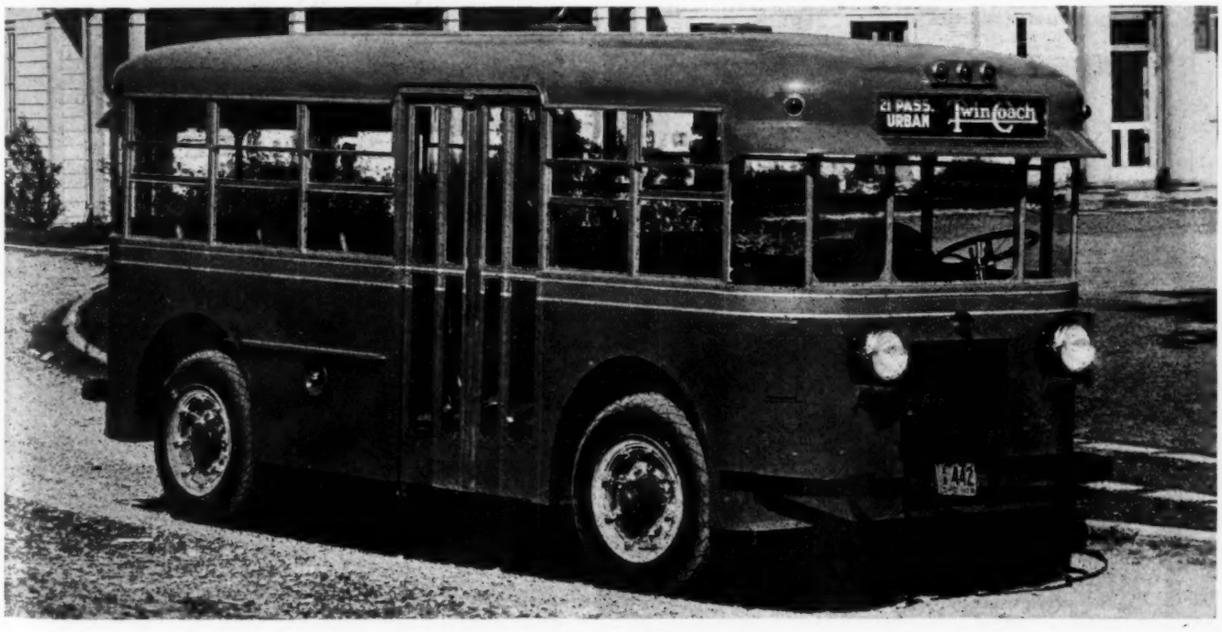
The combination entrance and exit door is located on the right side of the body immediately behind the front wheel-housing. The door is operated by a pneumatic door engine mounted overhead under a hinged cover with all working parts accessible. The door is the four-leaf, fold-out type giving a clearance of 37½ inches when open. A stanchion post with a guard rail is conveniently located at the center of the door opening so that entering passengers will use the forward side of the door and pass the driver's seat for fare deposit. Those leaving the coach use the rear section of the door, thus permitting a circulating load. The fare box is located on the rear of the engine housing in a position convenient to both the operator and the passenger as shown in the illustration.

The safety glass windshield is made in three sections with the main section in the center and two slightly angled sections on each side. The two rear corner windows are of curved glass. A sliding opening is provided at the left of the driver for signalling.

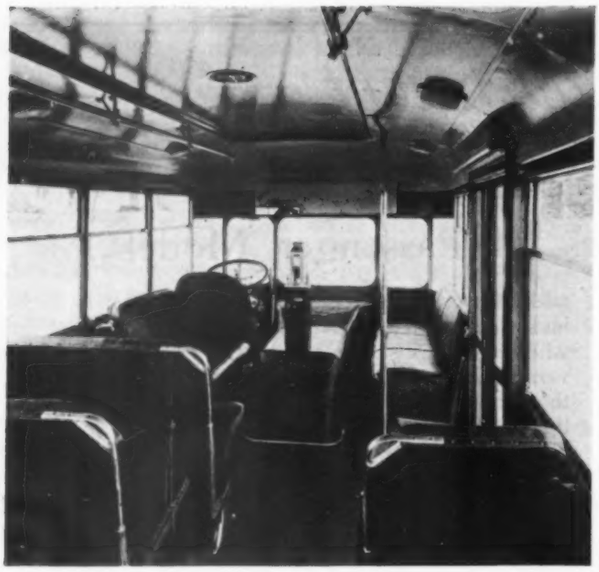
General Dimensions of Urban Twin Coach

Overall length—with bumpers	20 ft. 5⅜ in.
Overall width	85½ in.
Overall height (loaded)	97½ in.
Wheel-base	140 in.
Tread—Front and rear	71 in.
Interior headroom	74 in.
Step height from ground	12¾ in.
Road clearance—Front	7 in.
Road clearance—Rear	10 in.

The side windows have aluminum pilasters of narrow cross-section, which give practically unobstructed vision. The upper section of the window is stationary and the lower section may be raised. The seats are of a specially designed street-car type, upholstered with top grain brown spanish leather. The cushions and backs



The 21-Passenger Twin Coach



Interior of Coach Looking Forward, Showing Engine Housing

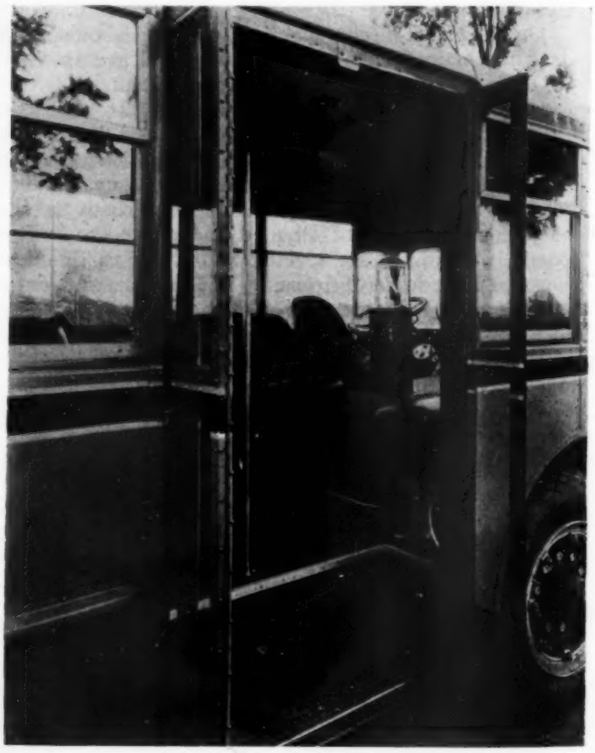
are unpleated, with the lower cushion having two-stage springs for greater comfort and longer life. All cross seats are equipped with corner grab handles. The bucket-type driver's seat is adjustable forward and backward. Single seats are placed on the right side of the aisle and dual seats on the left side, with a cross seat the entire width of the coach at the rear. Longitudinal seats are placed on each side of the engine housing and over the front wheel housings as shown in one of the illustrations. This arrangement gives an aisle width of 21¾ in.

The stanchions are chromium-plated steel tubing, located to assist and guide passengers upon entering and leaving the coach. The ceiling hand rails are also chromium-plated and are conveniently located along the ceiling on each side of the aisle and run the full length of the coach.

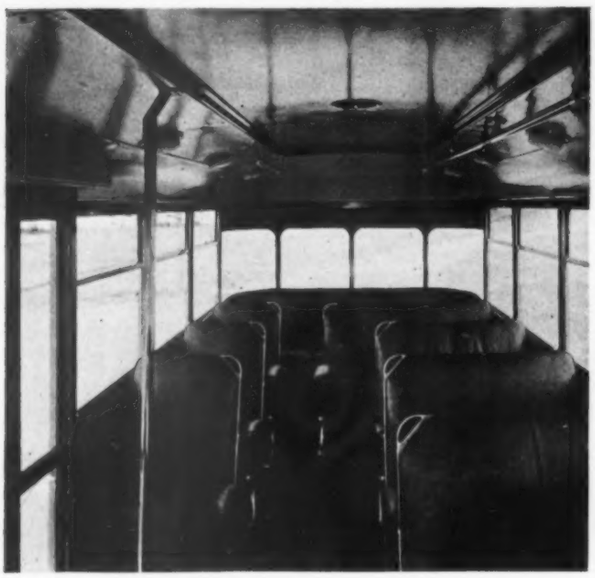
The side walls below the windows are covered with Plymetl, painted artillery gray. The ceiling is lined with aluminum with a Plymetl center section and is painted ivory. The interior is heated by using hot air direct from the radiator which is deflected into the coach through adjustable vents at the rear of the motor housing.

The outside lighting equipment consists of two "Tilt-Ray," flush mounted headlamps, four 3-in. marker lights mounted on each corner of the coach, and a combination tail-lamp, stop-light and directional indicator mounted at the rear. The interior is lighted by 8 frosted glass dome lights, each having a 15 candle-power bulb. Two step lights are provided and ten buzzer buttons are conveniently spaced along the window headers.

The coach is effectively ventilated by three Nichols-Lintern aerating type roof ventilators of ample capacity. In summer, the front corner sash may be lowered into the body, and in cold weather heated air is forced in through the engine radiator which serves to give a forced ventilation.



The Combination Entrance and Exit Door is 37½ in. Wide



Looking Toward Rear of Coach, Showing Seat Arrangement

Mirrors are installed to give the operator clear vision along the left side of the coach, with an auxiliary mirror installed to give a view of the farebox.

The exterior is finished by the pyroxylin system in any color desired. A special cleaning and priming process is used on all parts before assembly to prevent corrosion at the joints.

Spring steel front and rear bumpers are furnished, with the rear bumper equipped with a removable pin and hinge to allow access to the tire carrier. Both bumpers are supported at the center and at the ends to more evenly distribute the shock and to afford better protection to the coach body. A removable aluminum visor is fitted over the front and rear windows. The doors and windows are equipped with drip ledges which run the length of the coach.

The six-cylinder engine is similar in design to the one now used in the 40-passenger Twin Coach. It has a bore of 4 in. and a stroke of 4½ in., giving a piston displacement of 339 cu. in. and a horsepower rating of 38.4. It is equipped with aluminum pistons, each having four rings including one oil-regulating ring. The crankshaft is a chrome-nickel steel forging and has seven main bearings, each of which are 2⅝ in. in diameter. The connecting rod lower end bearings are 2¼ in. in diameter. The engine has a force feed lubricating system with a gear driven oil pump. Oil channels are drilled in the crank case leading to the main bearings and the crankshaft is drilled to conduct the oil under pressure to the connecting rod bearings. The timing gears are also pressure lubricated. The engine has an oil filter and an air cleaner as part of its regular equipment.

Sixteen of the main bearing bolts extend through the crank-case and as one piece continue through the cylinder block and hold the cylinder head. The construction is such that either the bearings or the cylinder block and head can be removed without affecting the tightness of the other.

The fuel system includes a motor driven fuel pump to assure a constant supply of gasoline on heavy pulls and over hilly routes. A 45-gallon gasoline tank is suspended under the body near the center of the coach.

The radiator is the tube and fin type and is installed in the front end of the coach with thermostatically controlled shutters.

The electrical equipment includes a Delco-Remy starting motor and a 600-watt, 12-14-volt generator with an Exide 160-ampere-hour motor coach battery located inside the body and readily accessible.

The clutch is extra large and is of the single disc type, with gun iron pressure plates and moulded lining. The transmission is a Brown-Lipe Model 50, having three speeds forward and one reverse.

The front and rear axles are specially designed for the Twin Coach by the Timken-Detroit Axle Company. The rear axle is the full-floating type with a bevel gear drive. The gear ratio depends on operating conditions, with a ratio of 6⅜ to 1 furnished as standard. Westinghouse air-operated or B-K vacuum power amplified hydraulic brakes are optional. Both systems operate on all four wheels and have "Brake Bloks" breaking against special gun iron drums. The emergency brake is located on the drive shaft and is sufficiently powerful to control the coach under full load in case of a service brake failure.

The chassis springs are interchangeable and are attached to the main body cross-members so that the weight of the coach is equally distributed. Each spring is 56 in. long and 3 in. wide. Spring pin bushings are rolled and burnished to give a good bearing surface and are lubricated by the Alemite system.

Rubber snubbing shock absorbers specially designed for this coach are bolted directly to each spring.

The steering gear is a Ross screw and lever type, irreversible in straight forward position.

The wheels are the cast steel, disc-type, equipped with quick demountable rims with 20 by 8.25 inch tires.

The New St. Louis Gas-Electric Coach

A SIX-WHEEL, pneumatic-tired gas-electric motor coach having a seating capacity of 40 passengers has recently been brought out by the St. Louis Car Company, St. Louis Mo. Intended primarily for city service, it has been designed to give a greater degree of comfort and safety to passengers by having gas-electric drive, electric service braking, front entrance and side exit doors, wide unobstructed aisles and comfortable seats.

The gas-electric drive, which provides smooth starting and rapid acceleration, combined with the use of large pneumatic tires and well proportioned springs, gives unusual riding qualities to this new motor coach.

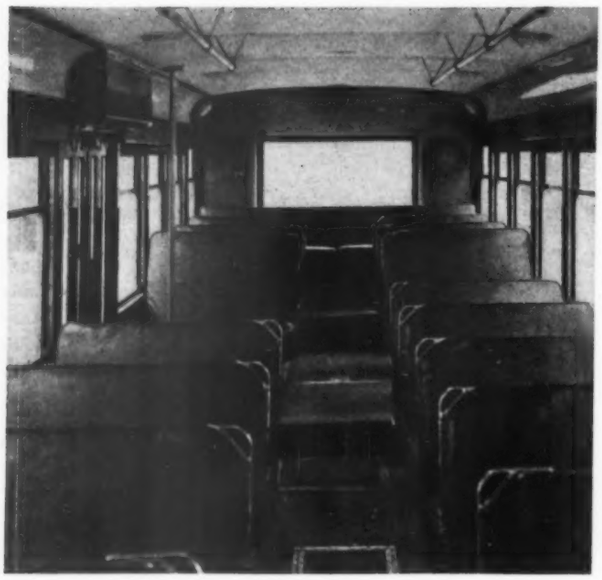
The entrance door is placed at the front end of the coach and ahead of the front wheels, the steps being stationary in a well. The drivers seat and the control levers are placed well over to the left side of the coach which gives an unusual amount of clear space for the entering passenger. The fare box stanchion is placed in a position where it will not interfere with the circulation of the load and is also in a convenient location for the driver. The exit door is located on the right side in a position approximately midway between each end of the coach and has a step well extending across to the opposite side seat. This separate entrance and exit door construction eliminates the necessity of some passengers walking the full length of the coach to reach the exit door as is required in the usual type of coach body.

The gasoline engine is a Waukesha type 6-RA with a nominal rating of 100 hp. The power plant, including the engine, generator and radiator, is mounted as a unit

General Dimensions of the St. Louis Gas-Electric Coach

Length overall	32 ft. 4¾ in.
Width over drip rail	8 ft. ½ in.
From road to top of roof	8 ft. 10⅞ in.
Seat spacing	2 ft. 5 in.
From floor to arch at center	6 ft. 10 in.
Width of door opening in clear	30½ in.
Aisle width	20 in.
Length of seat	34 in.
Seating capacity	40 passengers
Wheel base	210 in.
Size of tires	36 in. by 8 in. pneumatic
Horsepower of engine	100

Interior View Looking Toward the Driver's Seat



Interior View Looking Toward the Rear—The Well Containing the Steps That Lead to the Exit Doors Is Shown in the Foreground

on a subframe at the back of the coach and is designed so that. if necessary, it may be quickly replaced by a spare unit. The location of the power plant at the rear and the discharge of the exhaust gas at the roof, tend to eliminate undesired engine heat and exhaust fumes from the interior of the coach. A projected model designed for inter-city service will probably have the power plant at the front of the coach, making the rear available for baggage space.

The electrical equipment consists of a main generator directly coupled to a gasoline engine, and four motors arranged so that the motor cases form a part of the rear axles. The generators and motors are of sufficient size so that, when operated under extreme conditions, they will not exceed their maximum continuous temperature rating.

Each of the four rear wheels is independently driven by one of the motors through double-reduction, herringbone gearing. There are two rear axles connected by semi-elliptic springs, each consisting of two motor cases with the necessary drive gear housing.

A single bolster is used which may be detached from the frame by loosening four large bolts, allowing the rear truck to be quickly rolled out and replaced by a spare unit.

If necessary, any one of the four motors may be disconnected, both electrically and mechanically, in a few minutes and the coach can complete its run without damage to the remaining motors. The main control or reversing switch operates by a hand lever at the driver's position which connects the motors in parallel, series or reverse. The electric braking is controlled by a foot pedal, as in an ordinary automobile, the rate of deceleration depending on the amount of depression of the pedal. The brake is independent of the main generator or power equipment and is applied equally to each of the four rear wheels. The heat generated is dissipated by resistors of ample size which may be used to heat the interior of the coach.

The maximum braking rate, determined by the slipping point of the tires, about six miles per hour per second, is secured by depressing the pedal to maximum travel which will reduce the speed of the coach to three miles per hour. The mechanical brakes are used for a full stop and for parking. Both braking systems are

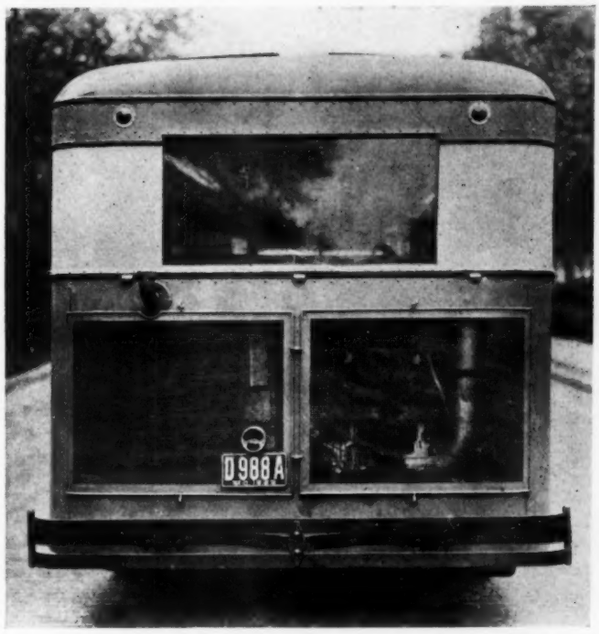
Gas-Electric Coach Built for City Service by the St. Louis Car Company

arranged so that no heat from them can reach the tires.

The axles are built up from sub-assembly units so that access may be had to any sub-assembly without disturbing the others. This type of design has been carried throughout the chassis so that servicing with spare units may eliminate the "time out of service" cost of maintenance to the maximum extent and so that inspection and repair of sub-assemblies may be made under better working conditions.

The body is of the single deck type with a low center of gravity. It is constructed with an all-metal frame built integral with the chassis. The outside sheathing is aluminum, protected by pressed steel side sills extending the full length of the body except at the door openings. Electric operation of both doors, which are equipped with safety devices, facilitates rapid loading and unloading. The interior is lighted with 10 dome lights. There are four marker lights, two in front and two at the rear. The coach is equipped with the standard seat made by the St. Louis Car Company, the driver's seat being of the adjustable semi-bucket type. All seats are upholstered in genuine leather and have been specially designed to give sufficient knee room and comfortable riding qualities. One single seat is placed beside each front wheel housing and the rear motor compartment forms a seat extending the entire width of the coach. The body is equipped with all-metal sash, both upper and lower, the upper sash being individual and stationary and the lower sash arranged to raise. The windshield is stationary and is divided in the center by a metal mullion. Two wing sashes arranged to swing outwardly are provided at the front end for ventilating purposes.

The interior finish is stained walnut and the lining below the window sill is sheet steel covered with Leatherwove buckskin. The sides of the body are insulated



Rear View of the St. Louis Gas-Electric Coach

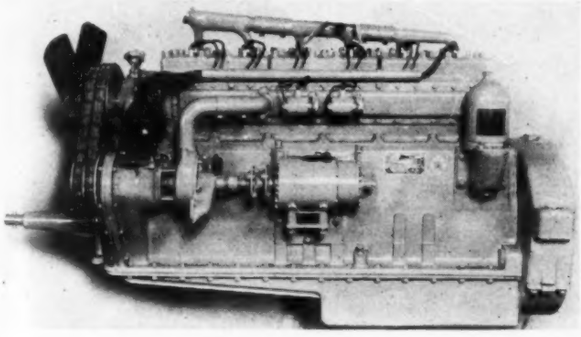
with ½-in. hair felt. The ceiling at the rear is of metal and arranged to form a cold air duct and is insulated with waterproof insulation 3/16-in. thick.

A safety feature incorporated in the design will not allow the motor coach to back down hill at a speed exceeding two miles per hour unless the control is thrown into reverse. The weight of the coach when empty is 21,000 lb.

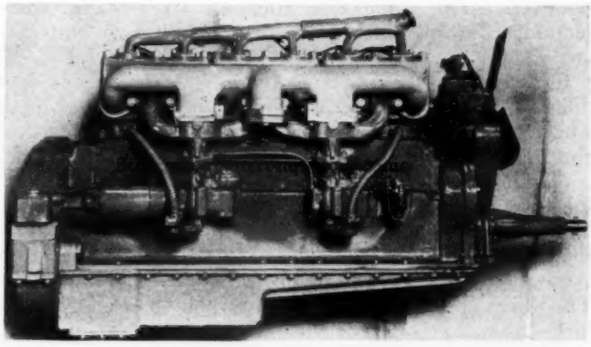
Extra Power in Sterling Petrel Engine

A MOTOR coach engine of extra power and with a capacity for full loads without overheating, excess noise or premature wear has been brought out by the Sterling Engine Company, Buffalo, N. Y., under the name "Sterling Petrel." It is offered either as new or replacement equipment for installations requiring maximum speed with minimum gear shifting.

The engine, which weighs 1,800 lb., develops its rated 150 hp. at 1,700 r. p. m., with a maximum of 200 hp. at 2,000 r. p. m. It is a six-cylinder, L-head type, cast en bloc, with a bore of 5¼ in. and a stroke of 6 in., giving a piston displacement of 779.3 cu. in. The



Left Side of Engine Showing Dual Ignition

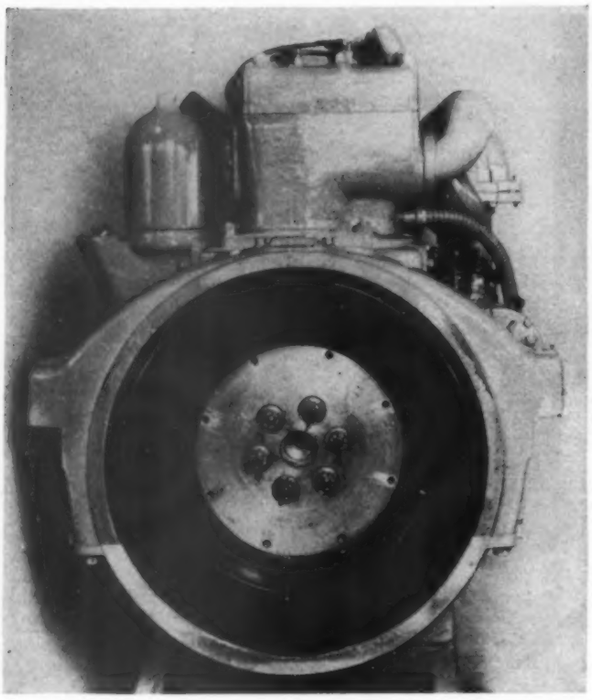


Right Side of Engine Showing Dual Intake System

crank-case is of cast aluminum with a deep structure to give rigid support to the crankshaft, camshaft and push rods.

The seven-bearing crankshaft is made of drop-forged, heat-treated steel weighing 152 lb., including the counterweights. The main bearings are 3 in. and the connecting rod bearings 2½ in. in diameter. It has an adjustable bronze thrust bearing 5 in. in diameter to take the thrust load of the clutch.

The main and connecting rod bearings are bronze babbitt lined, fitted without shims. The cylinders are



End View Showing Standard Transmission Mounting

cast en bloc of semi-steel iron and arranged with side valves, forming an L-head combustion chamber. The lower cylinder ends extend down into the crankcase, and the cylinder bores are honed after grinding.

The cylinder heads are cast in pairs, having a combustion chamber of the high turbulence type. They can be removed for service and inspection without disturbing the manifolds or valve mechanism. The camshaft is 1-3/16 in. in diameter, with four bearings which decrease in size from the gear end to the flywheel end of the engine so that it can be easily assembled or removed. The connecting rods are of I-beam cross-section, 12½ in. long, drop-forged with two bolts attaching the cap to the crank-pin end.

Cast iron pistons are recommended for speeds less than 1,800 r. p. m., but aluminum pistons are optional. Three compression rings are used and one oil control ring.

The exhaust valves are of silchrome steel and the inlet valves chrome nickel steel, 2½ in. in diameter, and have long, well-cooled stems. The springs are held to the valves by split taper washers fitted in grooves, and these hold large washers on which the spring seats. The valve springs are made of carbon steel and have a large diameter. The valve push rods are the mushroom type, carburized and hardened and fitted with an adjusting screw and lock nut. Small cover plates on the side of the crank case provide ample space for the adjustment or removal of the push rods.

Two Schebler 1¼ in. Model S carburetors are fitted to a cast-aluminum hot-spot inlet manifold. Heat control is provided and may be either fixed or connected to a hand control. A diaphragm fuel pump operated from the camshaft may be obtained as extra equipment. The lubrication system is of the force-feed type, with the pressure controlled by a relief valve.

Double ignition is furnished to each cylinder by means of a 12-volt distributor or a magneto as extra equipment. A North-East 12-volt starting motor and generator is furnished, with a generator of extra capacity available at extra cost. The clutch mounting is S. A. E. Standard No. 1.

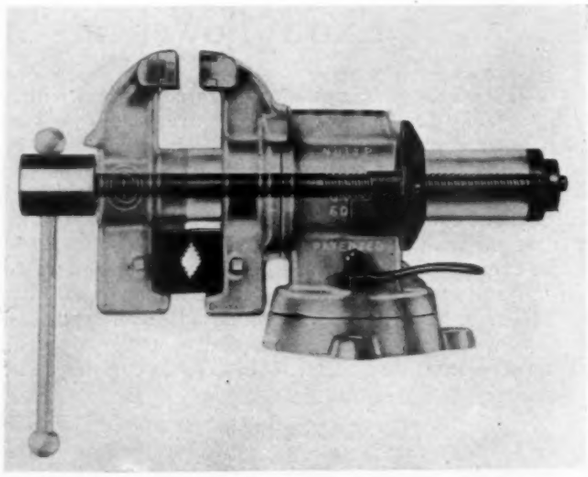
The engine has a full force-feed lubrication system, with pressure feed to the main bearings, connecting rod bearings, wrist-pin bearings and accessory drive sprockets. A cast iron oil pump with hardened gears delivers the oil to a distributing manifold, from which the oil is led to the various bearings through copper tubing. An oil strainer of brass cloth located in the oil pan prevents any foreign material from entering the pump. If this strainer should become obstructed, a by-pass valve allows the oil to pass directly to the engine.

Water for cooling is circulated by a centrifugal pump driven at one and one-half times engine speed. The radiator fan is mounted on an adjustable bracket and is driven by two separate leather belts as shown in the illustration.

A gear-driven governor can be incorporated in the engine if desired.

Bench Vise Adjustable to Any Angle

THE Oswego Tool Company, Oswego, N. Y., has placed on the market a sturdy bench vise, the clamping jaws of which can be adjusted to any angle in relation to the horizontal center line of the vise. The body of the vise, which has been designated as the Nutyp, is in the form of a cylinder, through the center of which passes the main screw on the end of which is an adjustable collar nut. The vise jaws rotate around the main screw. Proper tension on the rotating jaws is set up by two machine screws on the main nut. The



Phantom View of the New Oswego Adjustable Bench Vise

horizontal swivel is locked when the jaws grip the work. The pipe jaws and vise jaws are independent of each other.

Since the horizontal cylinder swivel in combination with the swivel base permits holding the work at any desired angle, it is possible to hold pipe in a vertical position for threading. The top of the cylinder is flattened for use as an anvil.

More Power and Speed in the New A.C.F. Motor Coach

TO fulfill the demands of those operators who have been asking for larger, faster and heavier motor coaches, A. C. F. has announced its new series 175. This will have a 175 h.p. Hall-Scott engine, and larger and heavier clutch, transmission and axle equipment than former models, also a longer wheelbase, which will provide for body capacities of up to 40 passengers. Reports show this new equipment to be capable of a speed of eighty miles an hour under full load without discomfort to its passengers.

Particular attention has been given to the design of the steering and operating mechanism to make the coach easy to handle under all traffic conditions. In a coach of this size and weight it is highly desirable from a safety standpoint to have a steering mechanism that is dependable and capable of responding instantly to the control of the driver. This object has been accomplished in the series 175 coach by the use of ball bearings in important friction points. It is claimed that the coach will handle as easy as a pleasure car.

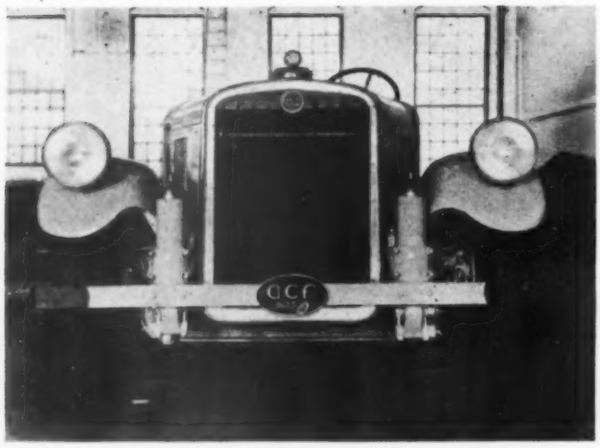
The power plant is a six-cylinder, 5 in. bore and 6 in. stroke 707 cu. in. engine which develops its rated 175 horsepower at 2000 r.p.m. It has a seven-bearing, counter balanced crankshaft, equipped with a torsional vibration dampener, and an overhead cam shaft and valve construction. The head and cylinder liners are cast of a special chrome nickel alloy, which is harder than the grades of semi-steel ordinarily used for this purpose and has the characteristic of being able to withstand high temperatures without softening.

The Hall-Scott overhead distillation system for lubricating oil is used and its efficiency has been increased by connecting the outlet breather with the carburetors to provide a slight vacuum in the crankcase. The engine will have dual ignition and the combustion chamber will be similar to previous models. The pistons are of aluminum alloy, but very heavy in cross-section, with split skirts and non-expanding steel rings cast integral to control expansion. They are fitted with six piston rings; the three upper ones are of the plain compression type and the three lower rings are a combined oil control and compression type.

Front View of Observation Parlor Car Body

The accessories are all mounted high on the engine and are so located that, if necessary, any one may be removed without disturbing the others. They are driven by two large silent chains which run over large sprockets and are provided with manual adjustments. Two carburetors are mounted on twin intake manifolds which have long branches. Gasoline is supplied to the carburetors under constant pressure by a syphon pump having a maximum capacity of 40 gallons an hour.

A.C.F. Series 175 High Duty Motor Coach



Front View of Chassis Showing Air Springs

The cooling system includes a 24-in. four-blade fan positively driven and a centrifugal water pump made of non-corrosive materials and running on a stainless steel shaft. Due to the greater horsepower of the engine and the increased demand for longer life of the power transmission units it was found necessary to design entirely new mechanisms for this coach. Consequently all transmission units have been carefully balanced to provide for the extra requirements.

The clutch is of the double-plate type with lining so arranged that the heat is dissipated through the heavy driving rings and flywheel. Both the clutch release and pilot bearings can be lubricated with a pressure gun from outside the clutch housing.

A three-speed transmission has been designed for the coach, which includes larger shafts, bearings and gear faces than have been used on previous transmissions, with heat treated and ground chrome nickel steel shafts, and with heat treated, case hardened and ground nickel steel gears. The countershaft is set at an angle of 45 deg., in relation to the main shaft, to increase the ground clearance, and the shifting lever is mounted on the side of the transmission case.

The three-section drive shaft is fitted with four oil type universal joints. The center section of the drive shaft is mounted at both ends in self-aligning ball bearings, protected from dust and splash by rotating slingers mounted on the drive shaft.

The rear axle is of spiral bevel, single reduction type with full floating axle shafts and Hotchkiss drive. The pinion and ring gear have 2½-in. gear faces and are of 5 per cent nickel steel, double heat treated and case hardened for extra strength and resistance to wear.

The springs are large in dimension and practically flat under load, the rear spring being 64 in by 5 in. and the front spring 43 in. by 3½ in. The forward springs are shackled at the front to special Gruss air springs and their rebound is controlled by double-acting Houdaille hydraulic shock absorbers. All spring pins are 1½ in. in diameter and case hardened and ground.

The front axle is of the reverse Elliott type with spring pads and shock absorber mountings forged integral. The vertical king pins, in line with the centers of the tires, support the spindles which are mounted on ball thrust bearings. The steering gear is of the variable leverage screw and nut type.

Two independent sets of brakes are provided, the service brakes being Westinghouse air-operated on all four wheels. A six-cubic-foot compressor on the engine supplies air for the brakes and the storage tank which is located inside the left frame rail where it is thoroughly protected. The emergency brake is operated by a hand lever to the left of the driver and is located on the center section of the drive shaft. It consists of two drums 11 in. in diameter and 5 in. wide upon which four lined shoes are operated by a common lever. Die pressed woven brake lining is used against alloy iron drums.

The frame sails are in two sections, joined together in front of the rear kick ups. The front section is the fish belly type with a maximum depth of 11 in., flange width of 4 in., and a thickness of ¼ in. The top of this section of the rail is straight, the low floor level being obtained by mounting the front springs to the side instead of beneath the frame rails. The rear section is of 5/16 in. material with a pressed arch over the rear axle which is reinforced with ¼ in. plate. Heat treated carbon steel is used in the frame.

Six pressed steel cross-members, thoroughly braced and gusseted, are fastened to the frame rails with steel rivets. A seventh cross member of the front of the frame is of cast steel and forms the front motor and radiator support.

These new coaches are being manufactured in two wheelbase lengths of 240 in. and 264 in., thus providing for body capacities of from 30 to 40 passengers, depending upon the style of body and type of seat installed.

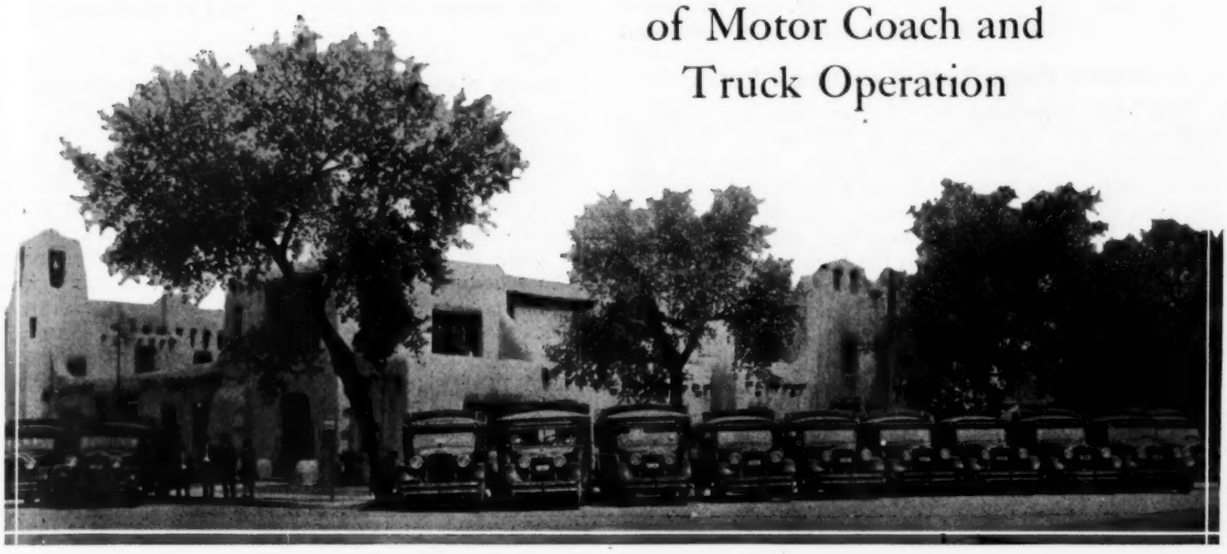
The first coaches in the series have been equipped with the observation parlor car body but other types, with or without reclining chairs, are available. The special features of the bodies include full headroom and also provision for carrying the baggage of passengers inside.

* * *

Utah Parks Company White 6-Cylinder Coach in Cedar Canyon, Southern Utah

Every-Day Problems

of Motor Coach and Truck Operation



This Month's New Questions

Question No. 8

Selecting and Training Drivers

"In hiring drivers, what qualifications should be considered essential? What examinations should be given, and what experience is desirable? What is the most effective way of training drivers to perform their duties efficiently and to observe the rules of safe driving? Should a merit and demerit system be used, hooking it up with a bonus system? If so, what system and amount of extra pay have been found most successful?"

Question No. 9

Planning A Motor Coach Garage

"We would like to have some pointers from more experienced operators of motor coaches as to what we should look out for in building a garage to house and maintain (both running and heavy repairs) about thirty motor coaches. What equipment should be provided for the inspection and overhaul of the rolling stock? What provision should be made for heating and ventilation? Is there any generally accepted practice as to the location of gassing, washing, inspection, repair and storage space?"

What Is Your Answer?

Replies to Question No. 4

Handling Mail by Motor Coach

"What is the best method of taking care of mail traffic, previously handled by train, when it becomes advisable to take off the train on account of declining passenger business? Can mail be handled profitably in motor coaches if they are put on when the train is taken off?"

Handles Mail In Special Compartments

We only operate motor coaches which have taken the place of former train service, and on these runs we are handling all of the United States mail and parcel post successfully. On two of the coaches, we have built-in mail compartments on the inside of the coach which adequately takes care of all of this mail, which is placed under lock and key and is out of the way of the passengers. On another of our motor coaches, the mail is handled in a separate compartment in the rear, entirely separated from the passengers by a wall.

We receive the same compensation for the handling of this mail on motor coaches as we did for transporting it on the passenger trains.

H. D. POLLARD,
Vice-President & General Manager, Central of Georgia.

Closed Pouch Service on Motor Coach

We have experience in only one instance where a passenger train with scheduled mail service has been replaced with a highway motor coach. Some time ago we discontinued a local passenger train in each direction between Dubuque and Waterloo. On these trains the Railway Post Office Department had authorized closed pouch mail service, and when the highway motor coach was substituted the department transferred the closed pouch mail service to the highway motor coach.

The mail pouches are stored in the rear end of the highway motor coach, which is equipped with folding seats which may be used by passengers if needed.

J. F. PORTERFIELD,
General Superintendent of Transportation, Illinois Central.

Replies to Question No. 5

Dispatching of Tractors and Trailers

"In working out an operating plan for a tractor and semi-trailer service intended to provide frequent deliveries between a half-dozn stations, is it better, from the standpoint of good service and of keeping operating costs as low as possible by eliminating tractor standing time and light mileage, to arrange a fixed schedule for the tractors between stations and hold them to it whether or not the trailers haul full loads, or to work out some dispatching scheme whereby the tractors can be sent at any time to any station where a fully loaded trailer is waiting?"

Adopts Operation Program

In our judgment the proper way to operate a service of this character is on a program of operation, in the determination of which local conditions are the major consideration.

These conditions may be such that the same definite program can, without variation, be set up for each day covering the whole period of the day; then again they may be such that only the main features of the operation can be programmed, and they may have to be varied as between different days of the week.

Briefly, therefore, our idea is that the program scheme is the best method of operation, the rigid adherence to which depending, as above stated, upon local conditions.

R. K. STACKHOUSE,
General Superintendent Stations & Transfers, Pennsylvania.

Eliminate Light Mileage

It has been proven in our service that the most economical way of operating our tractors and trailers is to eliminate as much as possible the tractors running on light mileage. Most of the loads that we receive from our shippers move within a radius of five to seven miles each way, and having an empty trailer at the shipper's platform at all times not only provides additional floor space to the shipper, but it also has the tractor available a considerably longer time than would be the case were the tractor obliged to wait at the shipper's platform until trailer was loaded. In most instances, this would consume in the neighborhood of two hours' waiting time.

Most of this equipment is governed so as to keep down the maintenance cost, and also as a safety measure, and the average speed is in the neighborhood of 12 miles per hour. If we were to drop the trailer at the shipper's platform and return to the starting point of our tractor and return for the trailer when loaded, it can readily be seen that an hour's time at least would be consumed in light mileage, and this would involve the tying up of the tractor while doing so. We have a fixed schedule for the time to pull most of our loaded trailers from various shippers and have made arrangements that in case the trailer is not ready at the given time to be pulled, the shipper will notify our despatcher, who in turn despatches the tractor when the load will be ready for it.

We have a fleet of four Mack tractors and twenty 10-ton Trailmobile semi-trailers serving some fifteen shippers who sometimes have two to four pulls a day. With this equipment, we handle some 175 to 200 tons per day. We find it a good policy never to pull the trailers until they are fully loaded. With this arrangement we have a tractor available that can be sent to any of the shippers' platforms to pick up a load any time that we receive a call to do so.

M. P. BURKE,
Assistant Superintendent, Chicago Tunnel Transport Co.

Replies to Question No. 6

Insurance for Motor Coach Operators

"What have the various railway motor coach companies found to be the most satisfactory method of handling insurance? Do they adopt generally the method of straight insurance on the individual-coach basis; do they find it preferable to place the insurance on a gross income basis; do they find it desirable to carry all the risk themselves; or do they find it expedient to carry the risk in the lower amount—say, up to $25,000 for any one accident—themselves, and farm out the higher amount, up to, say, $100,000 for any one accident, with independent insurance companies?"

Sets Up Insurance Reserve

We have from an early date assumed our own liability insurance, setting up a substantial reserve each month and correcting it at the beginning of each new year.

R. W. BUDD,
Vice-President & General Manager, Northland Greyhound Lines.

No Opportunity For Choice

All of our operations are under the jurisdiction of the Public Utilities Commission of the state of Colorado, which requires that public liability and property damage insurance be carred with some company authorized to do business in the state of Colorado, and that a copy of the policy be filed with the commission; with insurance, for death or injury to any one person, of $5,000; total

liability, $10,000 to $50,000, depending upon the capacity of the equipment. From this, it will be noted that there is little opportunity for choice in our case.

F. A. PEIL,
Assistant to President, Denver & Rio Grande Western.

Buying Insurance Less Expensive For Some

At present we are carrying insurance rather than assume the risk ourselves, which we believe is desirable due to the fact that the insurance company has a large personnel who are well qualified to take care of claims at almost any point and can probably do so at less expense than for a carrier to build up its own organization. If operations were sufficiently extensive, it might be desirable for a carrier to handle its own risk, but this would be somewhat difficult at present due to state laws in effect for the protection of the public.

P. J. NEFF,
Vice-President & General Manager, Missouri Pacific Transportation Co.

Build Up A Reserve

Where a railroad operates only a small motor coach service, it is my judgment that it cannot afford to carry its own insurance; but where there is a substantial operation involved, I am certain, by accruing a reasonable reserve, say five mills or one cent per coach mile, that with its staff of lawyers, claim adjusters, and company surgeons, it can take care of its own coverage to as good, if not better, advantage than by placing it with an outside concern.

RAILWAY OFFICER.

Buys Insurance On Mileage Basis

After trying several methods of carrying insurance on motor coaches, the one adopted as most satisfactory both from the standpoint of the carrier and the assured seems to us to be the payment to the insurance company on a mileage basis on a fixed rate per mile. Under this contract, any piece of equipment owned or operated by the assured is automatically covered at any point of operation. The coaches to be operated in a given state and on a certain certificate must, of course, be qualified with the commission of that particular state. The insurance company, however, does issue a blanket policy covering all equipment owned, subsequently acquired, or leased by the assured. When and as additional equipment is taken on, the assured notifies the insurance company.

The rate per mile can be determined in general by a computation based upon the equitable rate for the particular assured, taking into consideration his experience and the territory in which he is operating, times the number of pieces of equipment; and this total divided by the probable mileage of the carrier during the year.

The advantages of this plan to the assured are first, it obviates the possibility of equipment operating without insurance; second, assured pays insurance only when equipment is incurring a risk, that is, when it is actually operating and not in the garage; third, it enables the assured to predetermine that very important element of his cost; and fourth, it eliminates a good deal of complicated record-keeping in the event the assured is operating more than one line.

The advantages to the insurance company are: first it produces the greatest income in the seasons when the hazard is greatest, since the more miles are operated, the higher is the premium rate; second, the tendency of the industry is toward higher mileage on individual coaches, with fewer coaches, which under a specified car basis would tend to reduce the income while increasing the hazard; third, it eliminates a certain amount of complicated record-keeping.

It does not seem advisable at this stage of the industry for the assured to attempt to participate in his own insurance. It is well to have the insurance company interested in all of the claim settlements, in view of the fact that it is difficult and expensive for the assured to build up his own claim organization. Further, a number of states require the total insurance on the part of the assured, or demand, in lieu of full coverage, a cash or collateral bond.

We have made a very extensive study of the problem of motor coach insurance, and would be glad to furnish information on this subject to any other carriers.

E. F. RUMPF,
Vice-President, Greyhound Lines.

This department has been established as a regular monthly feature of the *Motor Transport Section*, to provide a means for the exchange of information, based on experience, on every phase of motor coach and motor truck operation. It is strictly by and for the readers of the *Motor Transport Section*. If you have a question about any matter of motor coach operation or maintenance procedure, concerning which you would like to know what the experiences of others have been in handling the same problem, you are cordially invited to submit it for publication in this department. Your name will not be published with the question. In order that those who submit questions may have the benefit of as many viewpoints as possible in the answers to their questions, all readers of the *Motor Transport Section* are urged to give the benefit of their experience to our questioners and to others through replies to the questions published, when such questions strike at a matter which they have had to handle. We feel sure that our readers will be willing to co-operate whole-heartedly in replying to the questions published, because by this means knowledge of the best methods will be made generally available and the general efficiency of motor coach and motor truck operation in the United States will thereby be promoted. All questions and answers should be sent to The Editor, *Motor Transport Section*, *Railway Age*, 105 W. Adams Street, Chicago. The replies, which are selected for publication, will be paid for at the rate of from $2 to $5 per reply.

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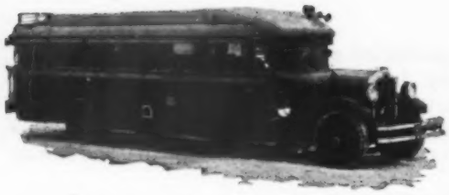
On the Central of Georgia at Savannah



NEWS *of the* MONTH

State Utility Commissioners Endorse Specifications Code

Uniform Bus Code Joint Committee announces unanimous acceptance by commissions of code recently evolved at Washington meeting

The National Association of Railroad and Public Utilities Commissioners has unanimously endorsed the provisions of the Uniform Motor Bus Specifications Code, according to a recent announcement of the Uniform Bus Code Joint Committee. The endorsement, it is stated, comes as the result of an impartial study of the code by a committee of the Commissioners' association. This latter was headed by Amos A. Betts, public utility commissioner of Arizona.

The Uniform Bus Code Joint Committee expresses its gratification over the endorsement and adoption of the code by what it calls in the announcement "the one organization that can really make it vigorous and effective in standardizing regulated bus specifications."

The present uniform code was evolved at a conference in Washington, D. C., on June 20 and 21. This conference was attended by representatives of organizations interested in motor coach operation, design, manufacture and regulation, including: "The Motor Transport Division, American Railway Association; the Motor Vehicle Conference Committee; The National Automobile Association; The National Bus Division, (now the National Association of Motor Bus Operators), American Automobile Association; the Society of Automotive Engineers; the American Electric Railway Association and the Bureau of Public Roads, Canadian Interprovincial Association.

This Washington conference was called to discuss a tentative code which had been drawn up previously by a formulating committee.

Several important changes and eliminations were made in the tentative code before its promulgation as the final code. The provisions of the tentative code of the formulating committee and the final code evolved at the Washington conference were published in the *Motor Transport Section* of July 27, page 287.

The announcement further states that the uniform code will hereafter be promoted by the Motor Vehicle Conference Committee, R. F. Armstrong, secretary, 366 Madison avenue, New York, among their other regulatory and legislative activities. Changes in the code necessitated by new developments will be made annually by the Uniform Motor Bus Code Joint Committee of which Dow W. Perkins is secretary, with headquarters at 25 Broadway, New York.

Regulation Bill Passed in Georgia

The Georgia legislature, on August 27, passed a bill requiring motor coaches operating in that state to secure a certificate from the Public Service Commission. The bill also levies a mileage tax on the motor coaches and provides a licensing fee. In addition it contains a "grandfather clause" which provides that companies operating before July 1, 1929, shall have priority in the allotment of certificates by the commission.

Pennsylvania Extends Operations Into Middle West

The Pennsylvania recently inaugurated a motor coach service between Indianapolis and Vincennes, Ind.—the first route to be operated by this road west of Pittsburgh, Pa.

The new line is owned by the Pennsylvania-Indiana General Transit Company, a recently incorporated Indiana subsidiary of the Pennsylvania, but will be operated by the Greyhound Lines, Inc. This Indianapolis-Vincennes route covers 150 miles and follows closely the lines of the Pennsylvania Railroad, making a branch run to serve Linton, Ind.

One daily round trip is made with a motor coach leaving Vincennes at 6:15 a.m. and arriving at Indianapolis at noon. A return coach leaves Indianapolis at 5 p.m. reaching Vincennes at 10:45 p.m. Stops are made at Greyhound stations in Indianapolis and Vincennes as well as at the Pennsylvania railroad stations in each community served. Tickets are sold by the Pennsylvania Railroad agents and any Pennsylvania railroad ticket for this journey is honored on the motor coaches. Because of the difference in rates, however, motor coach tickets are not honored on the trains. The motor coach fare between Indianapolis and Vincennes is $3.55, or 70 cents less than the train fare. In addition to this through service the Pennsylvania Indiana Company is also establishing a local highway line between Spencer and Martinsville, Ind. Three daily round trips are planned.

Burlington Seeks Rehearing in Missouri Case

The Burlington Transportation Company has filed with the Public Service Commission of Missouri a motion for rehearing in the case in which the Commission recently denied the application of the Burlington for a certificate to operate a motor coach line between St. Joseph and Hannibal and Quincy, and awarded the certificate to C. R. Hastings of Maryville, Mo.

In its petition the Burlington alleges numerous errors on the part of the commission and holds that the commission has violated its general policy and the Public Service Commission law by denying priority to the railroad in a case involving the establishment of highway service paralleling the railroad's lines. The motion further resents the intimation of the commission in its ruling awarding the certificate to Hastings that the Burlington was inconsistent. Some time ago the Burlington joined forces opposing a motor coach line on the route involved in the present case. It contended that its trains supplied ample service for the territory and thus the certificate was denied Hastings at that time. When the Burlington, through its highway subsidiary, proposed motor coach service on this route Hastings came forward with another application and was given the certificate. In this connection the motion said that the Burlington had a right to change its attitude on highway transportation as developments in that business dictated the desirability for such change.

Chicago & Alton Policy on Motor Coach Operation Outlined

W. G. Bierd, receiver of the Chicago & Alton, outlined the policy of that railroad towards motor coach operation in a recent statement published in Illinois newspapers. In this statement is announced the plan of the Alton to inaugurate through motor coach service between Chicago and St. Louis and between St. Louis and Kansas City. Mr. Bierd expects this and other expansion plans to be effective as soon as certain present difficulties are overcome.

The statement in full follows:

"We have been hampered through various causes in putting over certain extensions of the motor bus service which are proposed. Pending legislation in congress which will vitally affect the operation of motor buses in interstate traffic may reach a definite stage soon and this will clarify the situation in respect to operation from state to state. The bill now before congress does not contain all the features that the railroads would desire but it gives the existing transportation lines priority over newcomers and has other points of value. We have also been delayed in procuring the necessary authority to operate our local buses, and the new Illinois commerce commission may give us the concessions which we seek.

"The financing has been arranged to the extent of $110,000 for the purchase of additional buses should our program of expansion be made possible. We plan to operate through buses between Chicago and St. Louis and between St. Louis and Kansas City, while we will cater to local service between Joliet and Alton; Springfield and Peoria; Joliet and Peoria; Chenoa and Peoria; and Jacksonville and St. Louis, as well as certain lines along the western division. We are now operating motor buses between Bloomington and Joliet. We do not care to operate buses for local service between Joliet and Chicago, due to the slow progress in getting in and out of the latter city, not rapid enough for commuter patronage which is taken care of adequately by our steam trains.

"All of our local buses will coordinate with our steam trains at important points and we have an extensive program, all lined up, to be placed in operation the moment that the necessary authority from the state utility boards is extended and there is congressional action.

"We feel, in company with the management of many other lines, that the railroads should control the various transportation annexes, and the future may bring this into a reality. We believe that the traffic in our own particular territory should be served by our own company. The only exception that might be noted is the territory between Chenoa and Peoria. The Toledo, Peoria & Western road over which we operated trains for a time and exchanged passenger traffic, has so restricted its passenger service, that we feel that there is need for motor bus service as a substitute and we are ready to operate between Peoria and Chenoa on schedules which will connect with our present steam trains at each terminus.

"It has required time to develop our motor bus plans and the delay in completing our program has been due to causes beyond the power of the company to control. However, we are hopeful that within the next few months, all obstacles will be removed and we will be permitted to go ahead with our plans which will give the supplementary service which we feel the public is entitled to and which we also feel, the Chicago & Alton is best equipped to perform and maintain.

"We are well satisfied with our through passenger business. When I came to the Alton 15 years ago, we were handling 52 percent of the traffic between Chicago and St. Louis. Despite improvements and additional trains by competitive lines, our ratio has steadily increased until of late years it went above 60 percent, and has reached as high as 64. This encourages us to maintain our present service and also to supplement it with coordinating service by motor bus and which we hope, will not be long delayed."

Pennsylvania Philadelphia-Scranton Permit Granted

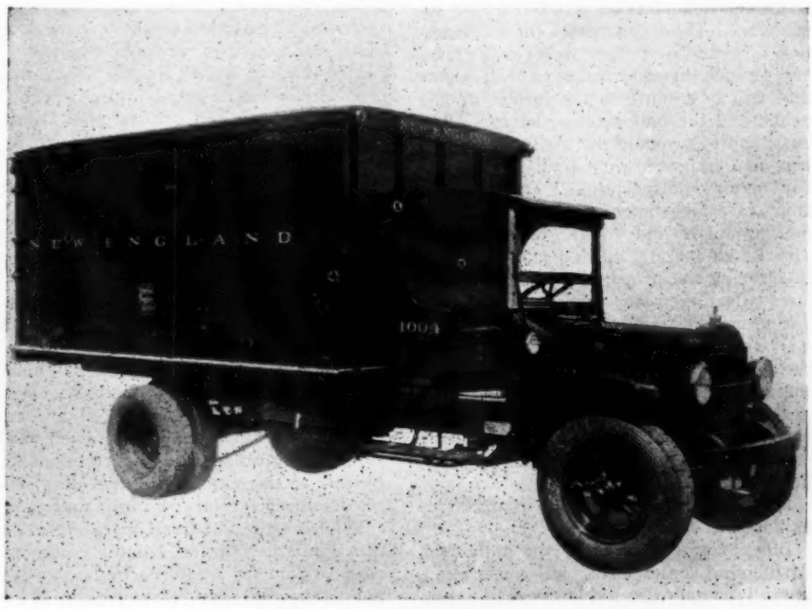
The Pennsylvania General Transit Company, motor coach operating subsidiary of the Pennsylvania, has been granted permission by the Public Service Commission of Pennsylvania to operate a line between Philadelphia and Scranton and Wilkes-Barre. Previous applications by other operators for the same route were denied.

The lines to both Scranton and Wilkes-Barre will operate over the Lackawanna trail through Doylestown, Easton, Bangor and Stroudsburg. From Stroudsburg the Scranton motor coaches will run through Mt. Pocono and Moscow, while those for Wilkes-Barre will go through Pocono Summit and Bear Creek.

New England Enters Freight Trucking Field

Plans for the extension of New England Transportation Company activities into the freight trucking field are announced in a recent issue of the New Haven employes magazine. The article is devoted mainly to an outline of the initial trucking service of the New England, recently established at Providence, R. I. In closing, however, it states "Later the New Haven also plans through the utilization of highway freight service to improve and quicken less-than-carload service by trucking to points of concentration loading the merchandise thus picked up into solid freight cars for shipment from such points the same day."

The operation at Providence is a service between industrial and manufacturing centers in Rhode Island and southeastern Massachusetts to the docks of the New England Steamship Company, New Haven subsidiary, in that city. The announcement further states, however, that plans are being perfected to extend this truck-boat service to other points served by the New England Steamship Company, such as Fall River and New Bedford, Mass., and New London, New Haven and Bridgeport, Conn.



Model A B Mack Truck in Highway Freight Service of the New England Transportation Company

National Association of Motor Bus Operators Organized

The National Bus Division, American Automobile Association, has become the National Association of Motor Bus Operators as a result of the reorganization which was effected at the meeting held in Chicago on August 22. The new organization will retain the same relationship with the American Automobile Association as did its predecessor while the new by-laws are designed to place the association on a sound financial basis and enable it to serve motor coach operators of the country in a more effective manner.

The reorganization was the result of action taken at the recent annual meeting where a sentiment developed that the association as a national medium of the motor coach industry should be changed from the old plan of a federation of state associations to a combination set up of both state associations and individual operator members. Accordingly a committee was appointed to draft a new set of by-laws for discussion at the Chicago meeting. From this latter meeting came the new set of by-laws and the change in name.

The objects and purposes of the new organization as set forth in the by-laws are: (a) To promote and develop the business of transporting persons by motor vehicles between fixed termini, on regular schedules, and through special service, to the end that the best interests of the public and the members of this Association be served. (b) To advocate the enactment of uniform, just and proper laws regulating the motor transportation business. (c) To promote closer relations with and cordial co-operation among the members. (d) To promote friendly relations with, and to secure the co-operation and good will of the public. (e) To improve the transportation service rendered by its members. (f) To promote the construction of roads of proper width and grade, and of such material and over such routes that will best inure to the benefit of the public and the motor transportation business, and to promote the maintenance, repair and improvement of all roads used for motor transportation. (g) To promote the establishment of necessary motor bus terminals and connecting schedules. (h) To co-operate with all public officials in securing the proper enforcement of all laws affecting motor transportation. (i) To promote street and highway safety. (j) To do all things tending to promote the safety, convenience, and betterment of the motor transportation business, and in general to do everything in its power to best serve the interests and welfare of the members of this Association and the public at large.

Membership is divided into four classes as follows:

Bus operator members. Any individual, partnership, company, or corporation, lawfully engaged in the business of transporting persons for hire in motor vehicles on the public highway as a common carrier, either directly or as a managing agent, may become an active member of the Association upon the approval of the Board of Directors and upon the payment of dues as hereinafter set forth.

State Associations. Any State Association of motor bus operators with members whose qualifications are substantially similar to the qualifications as hereinbefore set forth as those required for operator members of this Association, may become members of this Association upon the approval of the Board of Directors and upon the payment of dues as hereinafter set forth. Application for state association membership shall be in such form as prescribed by the Board of Directors.

Associate members. Motor bus manufacturers, tire and accessory manufacturers, body manufacturers, oil and gasoline producers, refiners, and distributors, and other persons, firms or corporations having dealings of a general nature with operator members of this Association may be admitted to associate membership at the discretion of the Board of Directors and upon the payment of dues as provided for this class of membership.

Honorary members. Public officials and other persons particularly interested in motor transportation shall be eligible for election as honorary members. Such honorary members shall be elected at any meeting of the Association by a vote of three-fourths of the members present, and shall not be required to pay a membership fee.

Motor coach operator, state association and associate members are given the right to vote in all matters, while honorary members have no vote. Each motor coach operator member is given one vote for each $250 or fraction thereof paid in dues but no such member shall cast more than six votes. Each state association is entitled to one vote for each $100 paid in dues while associate members are given one vote.

Dues of operator members are based on gross revenue figures. For those companies with annual gross revenues below $250,000, however, the number of motor coaches in operation determines the dues. The annual assessments on this class range from $10 for those operating five motor coaches or less to $100 for those operating 15 or more coaches. The annual dues of those operator members with gross annual revenues in excess of $250,000 range from $250 for companies earning annual gross revenues between $250,000 and $500,000 to $2,500 for companies whose annual gross revenue is $4,500,000 and over. The minimum annual dues for state associations is fixed at $100 while that of associate members is to be determined by the directors.

Other provisions relate to the government, officers, standing committees and meeting and election rules of the new organization. Directors are to be representative of the United States with one from each of 11 regions which are defined in the by-laws.

Federal Regulation of Motor Coaches Asked by Illinois Legislature

Federal legislation to control and regulate the activities of interstate motor coach lines is asked by the legislature of Illinois in a resolution, recently adopted and forwarded to the United States Senate. The resolution which has been referred to the Senate Committee on Interstate Commerce, reads as follows:

Whereas, in the absence of control, there has grown up a class of interstate motor-bus operation which is entirely unregulated and altogether irresponsible and subject to the regulation of no State or Federal authority whatever; and

Whereas the traveling public is being constantly victimized by such operators crossing State lines between Illinois and neighboring States, and who resort to all sort of illegitimate and unscrupulous activities at the expense of travelers who are unable to obtain redress; and

Whereas the bus lines operating under the regulation of the Illinois commerce commission are a source of large revenue to the State, and now constitute one of the State's major public utilities; and

Whereas the activities of the unregulated interstate "wildcat" operators subject both the legitimate stage lines and other forms of transportation to unfair,

Interstate Lines Must Pay Illinois Gas Tax

Interstate motor coach lines operating in Illinois must pay that state's gasoline tax according to an opinion prepared by Attorney General Oscar E. Charlstrom for the state director of finance. According to reports on the case one motor coach company had claimed exemption from the gasoline tax holding that a recent supreme court decision exempted lines doing an interstate business.

In his opinion Attorney General Carlstrom points out that the state is only taxing vehicles which use the public highways a reasonable amount to help provide highway improvement and that as such there is nothing in the gas tax which constitutes a burden on interstate commerce.

injurious, and unscrupulous competition; and

Whereas the present condition is highly detrimental to the interests of the State of Illinois, to the legitimate transportation interests, to the traveling public, and to the public generally; and

Whereas such conditions present an urgent need for adequate Federal regulation, at least, as to proper certification and control; Now, therefore, be it

Resolved by the Senate of the Fifty-sixth General Assembly of the State of Illinois (the House of Representatives concurring herein), That the President of the United States, the Senate and House of Representatives of the present Congress, and the Interstate Commerce Commission be memorialized to take all possible and necessary action to provide proper legislation to control and regulate the activities of interstate motor-bus lines; and be it further

Resolved, that a copy of this resolution be forwarded to the President of the United States, the President of the Senate, and the Speaker of the House of Representatives of the present Congress, and to each Senator and Representative therein from the State of Illinois, and to each member of the Interstate Commerce Commission.

Motor Transport Discussions At A. E. R. A. Convention

Several papers and discussions of interest to highway motor transport operators will be included in the program of the forty-eighth annual convention of the American Electric Railway Association to be held at Atlantic City, N. J., from September 28 to October 4.

Discussion of the general subject "To day's Transit Task" will be featured at the opening session on September 30. Included under this head will be the paper "Better Cars and Buses" by M. B. Lambert, transportation sales manager, Westinghouse Electric & Manufacturing Company, New York. Under the general subject "Traffic Regulations" which will occupy the second day's deliberations comes the paper "Basic Regulation Principles" by Col. A. B. Barber, manager transportation and communication department, United States Chamber of Commerce. At the informal round table luncheon conferences on this second day "Motor Bus, Interurban and Long Distance Operation" will be discussed. Likewise the October 2 round table conferences will consider the subjects of "Motor Bus, City Operation" and "Motor Bus Maintenance Methods."

"Benefits of Unified Transportation Systems" will be discussed by Thomas N. McCarter, president of the Public Service Co-ordinated Transport, Newark, N. J., at the morning session on October 3. "Motor Bus Design" will be discussed at the round table conferences to be held on that day.

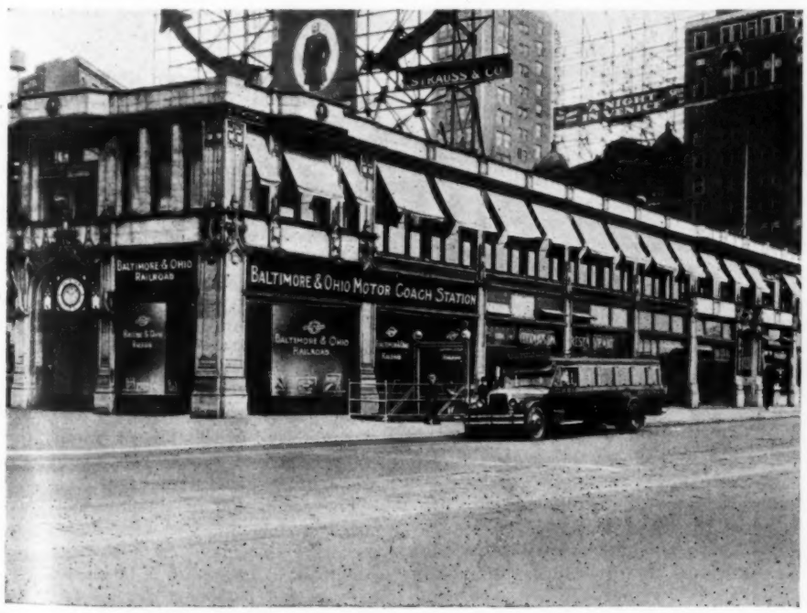
The Accountants' Association will, on October 1, consider a report of its subcommittee on bus accounting. This will be presented by E. A. Tuson, general auditor, Public Service Co-ordinated Transport, Newark, N. J., and chairman of the sub-committee. The Rolling Stock Division, at its session on October 1, will discuss the report of its committee on motor coaches, while the Way and Structures Division, meeting the same day, will consider the report of its committee on joint railway and motor coach terminals and also that of its committee on motor coach garage design.

Exhibitors at A. E. R. A. Atlantic City Convention

The list of exhibitors for the forty-eighth annual convention of the American Electric Railway Association to be held at Atlantic City, N. J., from September 28 to October 4 comprises 172 companies. The exhibition will open officially at 9:00 a.m. September 30 and continue until noon on October 4.

The list of exhibiting firms, together with the space which the exhibit of each will occupy in the Atlantic City Auditorium, follows:

COMPANY
Adams & Westlake Co.—E-619
Ahlberg Bearing Company—C-341-342
Aluminum Company of America—E-628
American Brake Materials Corp.—E-602-603
American Brake Shoe & Foundry Co.—E-562-563
American Brass Company—E-600-601
American Car & Foundry Motors Co.—C-308
American Fork & Hoe Company—D-402
American Steel & Wire Company—D-428-430
Anaconda Wire & Cable Company—E-599
Anderson Body Company—Portion of C-302
Anderson Brake Adjuster Co.—E-546
Aqua Oil Service, Inc.—E-523
Arco Company—C-334-335-336
Baldwin Locomotive Works—Portion of E-617
Bender Body Company—C-306
Bendix Brake Company—Portion of C-303
Bethlehem Steel Company—E-610-611-612-613-614-615-616
Robert Bosch Magneto Co.—E-532
Bragg-Kliesrath Corp.—Portion of C-305
Bridgeport Brass Company—E-579
J. G. Brill Company—E-513
Buda Company—E-618
Budd Wheel Company—C-324
Bus Transportation—Portion of E-575
Philip Carey Company—D-413-415
Carnegie Steel Company—D-429-431
L. C. Chase & Company—E-606
Cheatham Electric Switching Device—D-422
Chillingworth Manufacturing Co.—E-581
Chilton Class Journal Co.—E-589
Christenson Air Brake Co.—C-333
Clark Equipment Company—C-332
Cleveland Pneumatic Tool Co.—C-301
Cleveland Tanning Company—C-352-353-354
Barron G. Collier, Inc.—E-530-531
Continental Motors Corporation—C-351
Consolidated Car Heating Co.—E-512
Crew Levick Co.—E-533
Cummings Car & Coach Company—E-525
Curtin Howe Corporation—E-555
Dayton Mechanical Tie Co.—D-412-414
Dayton Steel Foundry Co.—E-521
DeLuxe Products Corp.—E-519
DeVilbiss Company—E-561A
DeWalt Products Corporation—A-100
Differential Steel Car Company—Portion of E-550
Dodge Brothers Corporation—C-315-316
Duff-Norton Mfg. Company—D-406
C. I. Earll—E-583
Eberhard Manufacturing Company—E-517
Economy Electric Devices Company—C-319B
O. M. Edwards Company, Inc.—E-524
Electric Railway Improvement Company—E-551-553
Electric Railway Journal—Portion of E-575
Electric Service Supplies Co.—E-576-577-578
Ellcon Company—E-526 and Portion of E-528
Erie Malleable Iron Company—C-329
Ferodo and Asbestos, Inc.—C-337-338
Frazer Electric Transmission Company—C-320B
Fremont Metal Body Company—C-349-350
Fruehauf Trailer Company—C-355 and E-608-609
Fuller & Sons Manufacturing Co.—C-300
General Electric Company—E-568
General Motors Truck Company—C-309
Globe Ticket Company—E-549
W. S. Godwin Company, Inc.—D-404
Gold Car Heating & Lighting Co.—E-548
Goroco Mechanical Spreader Company—E-520
Griffin Wheel Company—E-564-565-566
Hale & Kilburn—E-500-501
Hannum Manufacturing Company—E-516
Haskelite Manufacturing Company—E-514
Hercules Motors Corporation—C-304
Heywood Wakefield Company—E-506-507
Hilliard Corporation—E-623
Hunt-Spiller Manufacturing Corporation—C-348
Hyatt Roller Bearing Company—E-522
Illinois Motive Equipment Company—Portion of E-587
Ingersoll-Rand Company—A-105-107-109
International Motor Company—Portion of C-307
International Register Company—E-595
International Steel Tie Company—D-401-403-405-407-409-411
Irving Iron Works Company—E-537-539
Johns-Manville Corporation—C-322-323
Johnson Fare Box Company—Portion of E-587
R. F. Johnston Paint Company—E-621
Kelton-Aurand Manufacturing Company—C-345
Kenfield Davis Publishing Company—E-588
Lang Body Company—Portion of C-302
Leece-Neville Company——C-327
Lorain Steel Company—D-432-433-434-435
Macdonald Manufacturing Company—E-622
Mack-International Motor Truck—Portion of C-307
Mack-Motor Truck Company—Portion of C-307
Mack Trucks, Inc.—Portion of C-307
Manganese Steel Forge Company—E-604
Metal & Thermit Corporation—D-418-419-420



New B. & O. Train-Connection Motor Coach Station at Columbus Circle, New York

Co-ordinated Air and Highway Travel by Pickwick
Photograph shows "Nite Coach" and plane used in co-ordinated services of Pickwick Stages and Pickwick Airways, Inc., between San Diego, Cal., and Seattle, Wash.

Moisselle Welded Rail Joint Company—D-410
Money-Meters, Inc.—E-607
Morton Manufacturing Company—E-527 and Portion of E-529
Motor Wheel Corporation—C-346
Nachod & U. S. Signal Company—D-424
National Bearing Metals Corporation—E-591
National Brake Company—Portion of E-528-529
National Carbon Company—E-536-538
National Cash Register Company—C-330-331
National Malleable & Steel Castings—E-540
National Pneumatic Company—E-508-509-510-511
National Railway Appliance Company—Portion of C-319
New Departure Manufacturing Company—C-343
Nichols-Lintern Company—C-328
Norma-Hoffman Bearings Corp.—E-592
North East Electric Co.—C-326
Oakite Producuts, Inc.—E-552-554
Ohio Brass Company—E-502-503-504-505
Ohmer Fare Register Company—E-567
Okonite Company—E-596
Okonite Callender Cable Company—E-597
Oxalite Corporation—D-408
Pantasote Company, Inc.—E-515
Perey Manufacturing Company—E-620
Public Service Coordinated Transport—E-594
Pyrene Manufacturing Company—E-561B
Radel Leather Manufacturing Company—C-347
Rail Joint Company—D-400
Railway Age—E-590
Railway Materials Corporation—E-545
Railway Trackwork Company—D-421-423-425
Railway Utility Company—E-550B
H. H. Robertson Company—E-542
Rochester Printing Company—E-584
Ross Gear & Tool Company—C-325
Safety Car Devices Company—Portion of 570
St. Louis Car Company—E-627
Sattley Company—E-586
Geo. Saums Company—E-585
S K F Industries, Inc.—E-598
Skinner Automotive Device Co.—C-344
Spicer Manufacturing Corp.—C-303A
Standard Johnson Company—C-320A
Standard Steel Works Company—Portion of E-617
Stearns-Stafford Roller Bearing—E-558
Studebaker Corporation of America—C-312-313-314
Templeton Kenly & Co., Ltd.—D-426
Texas Company—E-625-626
Timken-Detroit Axle Company—C-317
Timken Roller Bearing Company—E-605
Tool Steel Gear & Pinion Co.—C-319C
Transit Equipment Company—E-560
Tuco Products Corporation—E-541-543
Twin Coach Corporation—C-310
Una Welding & Bonding Co.—D-427 and B-205
Union Metal & Manufacturing Co.—E-624
Universal Lubricating Company—E-544
Van Dorn Coupler Company—E-557
Wadell Engineering Company—E-518
Walter Motor Truck Company—C-321
Waukesha Motor Company—C-318
Westinghouse Companies—E-569
Westinghouse Electric & Manufacturing Company—E-571-572-573-574
Westinghouse Traction Brake Co.—Portion of E-570
Wm. Wharton, Jr., & Co.—D-416-417
Wheel Truing Brake Shoe Company—E-547
White Company—C-311
White Manufacturing Company—E-556
Wilson Imperial Company—E-559
Winchester Repeating Arms Company—C-339-340
Alan Wood Steel Company—E-534-535
Wood Conversion Company—E-593
Zenith Detroit Corporation—C-305B

Pickwick Seeks Idaho Line

The Columbia Gorge Motor Transportation Company has applied to the Public Utilities Commission of Idaho for authority to transfer part of its operating permit to the Pickwick Stages. The proposed transfer would deliver to Pickwick that part of the Columbia company's permit covering the route between Twin Falls and the Idaho-Utah state line.

Petition for the transfer states that the change is desirable because of the improved passenger service which will result. The Columbia Gorge at present operates from Portland, Ore., to Salt Lake City over the Old Oregon trail.

Baltimore & Ohio Extends West Virginia Service

The West Virginia Transportation Company, highway subsidiary of the Baltimore & Ohio, has announced motor coach service between Charleston and Clarksburg, W. Va., a distance of 162 miles. The new route is by way of Weston, Sutton and Gassaway.

Texas Commission Denies Standard Rate

The Texas Railroad Commission is not ready to fix passenger rates on all motor coach lines in that state at the established steam railroad fare of 3.6 cents per mile, plus 5 per cent, according to the recent announcement of Clarence E. Gilmore, chairman.

The announcement followed the proposal of the Southwestern Transportation Company, highway subsidiary of the St. Louis Southwestern, to embody this plan in its motor coach passenger tariffs.

The position of the Texas commission on the matter was outlined by Chairman Gilmore in reply to a statement from the Dallas Chamber of Commerce urging that the 3.6 cents per mile, plus 5 per cent, be adopted as the commission policy. "The commission is not going to do that," Mr. Gilmore said; "any action taken in the application of the Southwestern Transportation Company is not being taken as a precedent in fixing rates for the state as a whole. If the proposal is adopted it will be only for this case."

Burlington Seeks Illinois Line

The Burlington Transportation Company, highway subsidiary of the Chicago, Burlington & Quincy, has applied to the Illinois Commerce Commission for a certificate to operate a motor coach line between Galesburg and Chicago, via Aurora and between Peoria and Buda. The proposed line will be the first motor coach operation of the Burlington in the state of Illinois.

Pickwick Acquires Line in Mexico

Purchase by the Pickwick Corporation of Los Angeles of all the properties and franchises of Transportes Nuevo Leon, a Mexican company operating a system of motor coach lines covering more than 300 route miles, was announced on August 21 by Charles F. Wren, president of the Pickwick Corporation. In connection with this announcement, Mr. Wren also disclosed plans for the early extension of the existing Nuevo Leon line south to Mexico City and on to the Pacific coast town of Acapulco.

At present the Mexican system extends from Laredo, across the Rio Grande to Nuevo Garedo, south through the state of Nuevo Leon, through the cities of Vallecillo, Sabinas, Cienega, Monterrey, Santiago, Montemorelos and Linares, then crosses back into Tamaulipas, and passes through Hidalgo to Victoria, its present terminus.

An extensive program of highway improvements is now under way between Victoria and Mexico City, and south to Acapulco. As soon as these roads are available for motor coach travel through service will be inaugurated from Laredo to the Pacific coast via Mexico City. This new service will be operated in connection with existing lines now linking Laredo with San Antonio, Fort Worth, Dallas, and Oklahoma City. With this extension in operation, the system will include more than 1000 miles of route.

The new line is to be operated under the name of Pickwick International Stages, with Otto S. Crowder as general manager, and M. A. Tinoco, former general manager of Transportes Nuevo Leon, as assistant general manager.

The acquisition of the Mexican motor coach system by Pickwick follows the recent establishment by Pickwick Latin-American Airways of a tri-weekly mail, express and passenger service from Los Angeles to Mexico City and Guatemala City.

Alton Gets Missouri Certificate

The Alton Transportation Company has been awarded a certificate by the Missouri Public Service Commission to operate a motor coach line from Mexico to Louisiana, Mo. Schedules on the proposed route call for intermediate stops at Laddonia, Farber, Vandalia and Curryville and Bowling Green. Motor coaches will make the 60-mile run between termini in approximately two hours.

Oregon Lines Unite on Traffic Promotion

Five motor coach lines operating out of Portland, Ore., have jointly arranged a system of special party tours according to recent reports from that city. The tours range from 213 miles to 1485 miles with fares from $7.95 to $30. It is the stated purpose of the movement to stimulate the desire for sight-seeing travel among persons who do not have their own automobiles.

New U. P. Line in Colorado

The Union Pacific, through its subsidiary the Interstate Transit Lines, has been granted a permit to operate motor coaches between Denver and Limon, Colo. The permit covers a route now a part of the Pickwick-Greyhound system but the permit was granted despite the opposition of Pickwick.

This Colorado line of the Interstate is a section of the through route between Denver and Kansas City.

Nebraska Commission Approves Routes

The State Railway Commission of Nebraska recently approved applications for two motor coach routes out of Lincoln, Nebr. One of the certificates was granted to the Burlington Transportation Company for a route between Hastings and Kearney and the other to the Lincoln Coach Lines, which will operate from Lincoln to Sterling.

Texas Truck Lines Securing Permits

The Railroad Commission of Texas is engaged in the granting of permits to the several motor truck lines operating in that state and now required by the new law to secure certificates for their operations. The 60-days grace granted in the law has expired and the Commission announces it will henceforth proceed against truck companies operating without the required certificate.

Store-Door Delivery Plan of British Roads

The Southern Railway of Great Britain has inaugurated a system of store-door delivery service at selected points on its line, according to a recent article in Modern Transport (London). The plan involves the establishment of several railhead distribution stations for the collection and delivery of freight within a 10-mile radius of each center. The merchandise is transported by rail to these distribution points and then transferred to motor trucks for delivery to consignees. Out bound freight from these districts is loaded onto the motor trucks at the store-doors of consignors and trucked to distribution stations for loading into merchandise cars.

A special rate has been established on freight moving under the plan and the same charge applies to all classes of traffic.

Colorado Joint Lines Extended

The Denver-Colorado Springs-Pueblo Motor Way, Inc., motor coach operating company owned by the Denver & Rio Grande Western and the Colorado & Southern, which has been operating for some time between Denver and Pueblo, has recently extended its motor coach service from Pueblo to La Junta, Colo., from Pueblo to Canon City, and from Pueblo to Walsenburg.

Northland Granted Freight Line Permit

The Northland Transportation Company (now the Northland Greyhound Lines) was recently granted a permit by the Minnesota Railroad and Utilities Commission to operate a highway freight line between St. Cloud, Clear Lake, Becker, Big Lake and Elk River in that state. The certificate, however, limits the Northland trucks to the handling of l.c.l. freight which formerly moved over the lines of the Great Northern.

Pennsylvania Seeks New Line

The Pennsylvania General Transit Company, highway subsidiary of the Pennsylvania, recently applied to the Public Service Commission of Pennsylvania for a permit to operate a motor coach line from Harrisburg to the Pennsylvania-Maryland state line by way of the Susquehanna trail. The route would run through Lemoyne, New Cumberland and York and is reported to be part of a proposed line through Baltimore to Washington.

D. & R. G. W. to Operate On Pikes Peak

The Denver-Colorado Springs-Pueblo Motor Way, Inc., motor coach operating company owned by the Denver & Rio Grande Western and the Colorado & Southern, has secured the transfer of the certificate of Robert Wirth, permitting the operation of motor coaches between Denver, Colo., and Pikes Peak. The Colorado Public Utilities Commission has approved the transfer of the certificate.

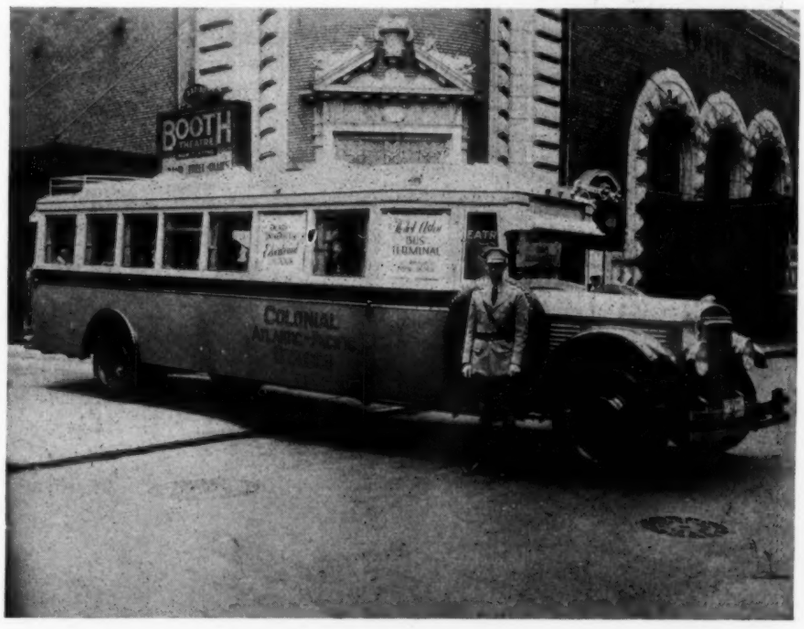
Railroads Oppose Independent Freight Trucker

The Pennsylvania and the Delaware, Lakawanna & Western were among other carriers which appeared before the Public Service Commission of Pennsylvania on August 29 to oppose the application of J. F. Hall for a certificate to carry freight and merchandise by motor truck from York to Scranton and from York to Williamsport, Pa. The opposing carriers said that Hall had been operating routes for some time without a certificate from the Commission.

Union Pacific Subsidiary Expands

The Interstate Bus Company, Union Pacific subsidiary, was recently authorized by the Nebraska State Railroad Commission to issue 56,747 shares of stock of $10 par value for the purpose of purchasing new motor coach equipment and extending its highway service in the trans-Missouri territory.

According to the report, the Union



Mack Motor Coach Which Recently Carried a Party of Clark University Faculty and Students from Worcester, Mass., Across the Continent and Back

Pacific is to absorb the entire stock issue and provide also $400,000 additional capital. Motor coach service will be extended from North Platte, Neb., to Denver, Colo.

Missouri Independent Seeks Lines Out of St. Louis

The Mississippi Valley Stages, Inc., of St. Louis, Mo., has applied to the Missouri Public Service Commission for authority to operate motor coaches on several routes radiating from St. Louis.

The application covers a line between St. Louis and Kansas City in connection with a through line from St. Louis to Chicago; a line from Kansas City to St. Joseph to connect with one from Lincoln, Neb. to Denver, Colo., and another line from St. Louis to Memphis, Tenn.

Greyhound-R. F. & P. Unite on Washington-Richmond Line

The Greyhound Lines and the Richmond, Fredericksburg & Potomac will henceforth operate jointly the motor coach line between Washington, D. C., and Richmond, Va. The R. F. & P. has acquired 49 per cent interest in the new company, to be known as the Richmond Greyhound Lines, and has sold to it six motor coaches.

C. S. Caesar of Chicago is chairman of the new corporation while the operation of its motor coaches will be supervised by W. H. Palmer of Richmond, Va.

Northern Pacific Plans Freight Trucking

As a result of its recent studies on the desirability of substituting motor truck service for unprofitable freight train runs, the Northern Pacific is now planning for the motor truck handling of L. C. L. freight in the Yakima Valley in Eastern Washington. This is at present the only section of Northern Pacific territory where extensive highway freight service has been decided upon. Studies covering the balance of the territory served by the railway lines are incomplete.

Tax Suit Before Oregon Supreme Court

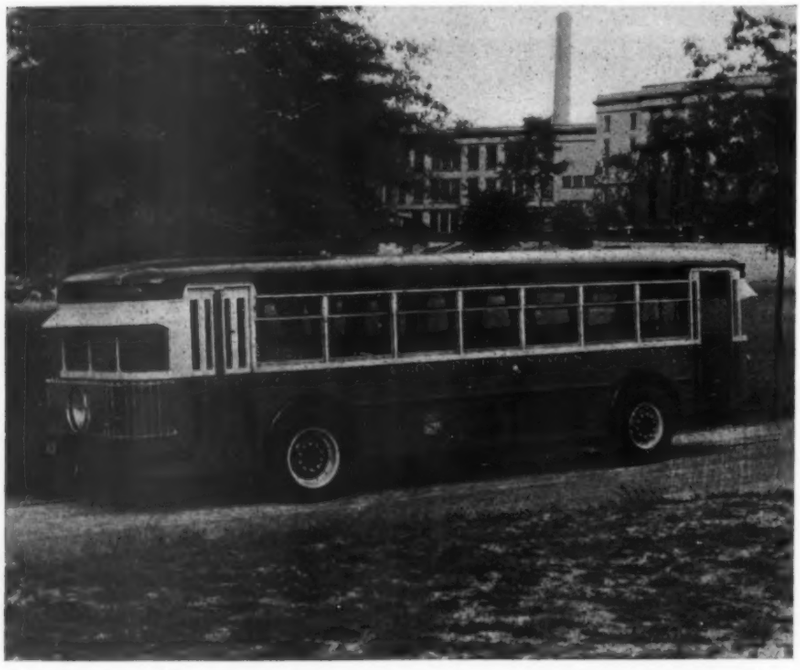
The suit by the Pacific Stages against the Oregon Public Service Commission involving the inclusion of the driver's seat in computing the tax to be paid by the motor coaches on the passenger per-mile basis has been carried to the supreme court of Oregon.

According to the complaint of the Pacific Stages the driver's space on the front seat accounts for 1,407,933 passenger miles out of a total 28,121,311 passenger miles charged against them for taxation purposes during the 21-month period ending July 31, 1928.

New Denver & Rio Grande Route in Colorado

The Rio Grande Motor Way, Inc., motor coach subsidiary of the Denver & Rio Grande Western, has applied to the Public Utilities Commission of Colorado for permission to operate a motor coach line between Colorado Springs and Pueblo.

The route will extend through the Royal Gorge Park and the Rio Grande Motor Way has secured the exclusive right to operate its coaches over the new Royal Gorge bridge to be built over the Royal Gorge by the Royal Gorge Bridge & Amusement Company. This right was in consideration of the railroad granting the bridge company permission to construct its bridge over the railroad tracks in the bottom of the gorge.



Suburban Express Model 37-Passenger Twin Coach in Service of Union Pacific Stages

N. Y. Prohibits Motor Coach Heating from Exhaust

The Public Service Commission of New York recently issued an order barring the use of exhaust systems as heating units for motor coaches. The action is designed to eliminate the hazard to passengers of monoxide and other poisonous gases. The order requires all motor coaches placed in service after December 1 to utilize other heating systems and existing motor coaches to make the change by January 1, 1931. Recently the commission completed a public hearing on the exhaust location and heating questions.

Pennsylvania Buys Indiana Line

The Pennsylvania General Transit Company has purchased the Greensburg-New Alexandria-Blairsville Bus Line, formerly owned and operated by the McDevitt Brothers of New Alexandria. The McDevitt Brothers owned a permit to operate a motor coach line between Blairsville and Greensburg, via New Alexandria and also a franchise to operate between Latrobe and New Alexandria. In addition they hold permits to operate groups and special party service from Greensburg, New Alexandria, Latrobe, Crabtree and Blairsville to all points within a 50-mile radius. The Pennsylvania is understood to have come into possession of these permits.

Union Pacific and Pickwick Get Wyoming Permits

The Interstate Transit Lines, Union Pacific subsidiary, has been granted a permit to operate motor coaches across the state of Wyoming. At the same time the Pickwick Stages, Inc., was given a permit to handle intrastate traffic in Wyoming. Formerly this company was limited to interstate business.

These decisions are in conformity with the new Wyoming law which makes it compulsory for the state utilities commission to issue motor coach operating permits to any firm or individual who is financially responsible.

Motor Coaches Replace Pennsylvania Trains in Maryland

The Red Star Motor Coaches, Inc., operating on the Maryland Peninsula, has arranged to cover with its motor coaches, the schedules of two Pennsylvania trains which were discontinued between Delmar, Del., and Salisbury, Md. The substitution was announced following a protest of the Salisbury Chamber of Commerce against the curtailment of passenger train service. The motor coach service is effective on September 29 and the Pennsylvania assured the Salisbury Chamber of Commerce that if the highway service proves inadequate the trains will be restored. Mail and baggage formerly handled by the trains will now be handled by truck. The Red Star Motor Coaches will connect at Del-

mar with morning and evening trains to and from Philadelphia, Pa., and Wilmington, Del., over the Pennsylvania.

Pickwick Building Nite Coach Factory

The Pickwick Corporation has commenced work on a $150,000 motor coach factory at 114th street and Redondo Boulevard, El Segundo, Cal. The plant will produce the company's new model "Nite Coach" and is expected to be completed about October 15.

The structure will be entirely of steel, concrete and stucco. The land, building and machinery will represent a total investment of approximately $200,000. Charles F. Wren, president of the Pickwick Corporation, in outlining the plans for the new factory stated that production of one "Nite Coach" a week was expected to be the regular schedule next year. He added that the company had on hand a large number of orders for these coaches.

Virginia Commission Favors Railroad Applicant

The State Corporation Commission of Virginia recently granted the Norfolk Southern Bus Corporation, highway subsidiary of the Norfolk Southern, a certificate to operate motor coaches from Ocean View to Virginia Beach. At the same time the applications of the Virginia Beach Bus Lines and the Peninsula Transit Corporation for the franchise were refused. The service over the new route will be on a two-hour schedule and will operate over the new Ocean Shore drive. Plans are also said to be under consideration for the interchange of passengers with the Peninsula Transit Corporation which operates a motor coach service from Ocean View to Richmond.

Utilities Commissioners Discuss Regulation

The National Association of Railroad and Utilities Commissioners at its recent annual meeting in Glacier National Park, Mont., discussed the problem of motor coach regulation. The organization's committee on services of public utilities companies, pointed out that where motor coach lines lie entirely within one state the matter of regulation is not difficult, but where two or more states are involved there are no means for regulation.

Accordingly, this committee recommended to the association that adequate authority for regulation of all motor coach services should be sought by the various commissions and promoted by the association.

Daily U. P. Service Between Portland and Salt Lake City

The Union Pacific Stages recently inaugurated a through route extending from the Pacific northwest to Salt Lake City, with coaches departing daily from Portland at 7:10 a.m. and 10:30 p.m. At the same time the Union Pacific announced through motor coach service from Spokane to Salt Lake City and from Salt Lake City to the west Yellowstone entrance to Yellowstone National Park and to points in Idaho, Washington and Oregon.

The Spokane-Salt Lake City service will be operated by the Interstate Transit Lines, while the services out of Salt Lake City to Yellowstone, Idaho, Washington and Oregon will be operated by the Gem State Transit Company. Both of these concerns are Union Pacific subsidiaries.

Pennsylvania Independent Seeks Reinstatement

The Frank Martz Coach Company, Inc., Wilkes-Barre, Pa., has applied to the Public Service Commission of that state for permission to operate motor coaches in northern and eastern Pennsylvania. The petitioner formerly operated over routes similar to those now sought but was ordered to discontinue several months ago when the Commission held that the crossing of the routes into New Jersey was a "subterfuge" to prevent regulation of the Pennsylvania authorities.

One of the routes sought by the Martz Company is between the New York-Pennsylvania line near Eldred and Scranton through Wellsboro and Towanda and Wilkes-Barre via West Pittston, Fortyfort and Kingston. The other two lines are over alternate routes between Wilkes-Barre and Philadelphia.

New M. P. Time-Table Lists 3,296 Route Miles

The latest edition of the Missouri Pacific Transportation Company's timetable, dated September 1, lists 32 scheduled motor coach routes covering 3,296 route miles. This compares with a listing of 25 routes covering 2,812 route miles in the previous time-table dated June 9.

Of the new routes established the longest is the 224-mile run between Kansas City, Mo., and Omaha, Neb.; next is the 75-mile run between Kansas City and Warrensburg, Mo. Other new lines are: Union, Neb., to Lincoln, Neb., 45.7 miles; Hope, Ark., to Nashville, Ark, 28.1 miles; McGehee, Ark., to Yancopin, Ark., 25 miles; Atchinson, Kan., to St. Joseph, Mo., 24.1 miles and Flat River, Mo., to DeSoto, Mo., 13.8 miles. Finally the Little Rock-El Dorado, Ark., line has been extended to Huttig, Ark., an addition of 24.7 route miles.

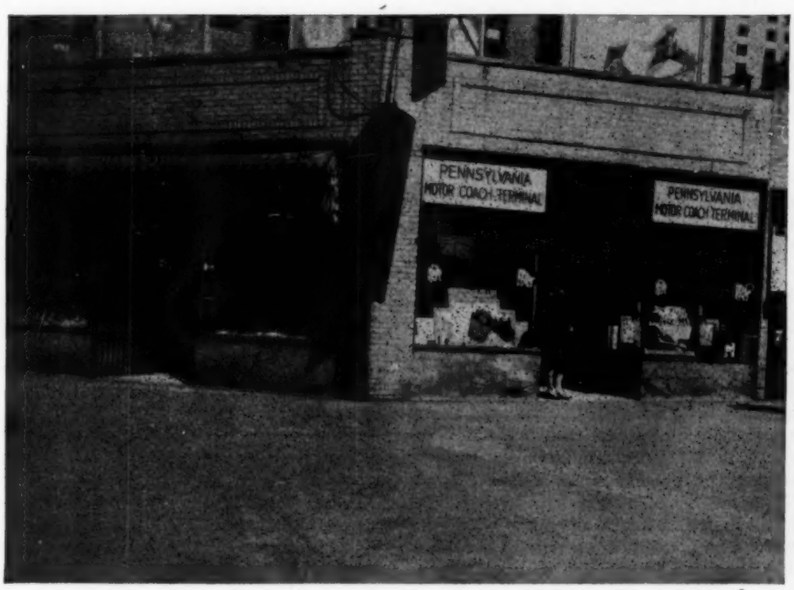
Enjoins Motor Coach Company

The New York Central, on August 29, was granted a temporary injunction restraining the Canadian-New York Coach Lines, Ltd., from carrying passengers through New York State. The order which was entered by Justice Clarence MacGregor at Buffalo, will continue in effect pending a trial of the action brought by the railroad.

In its action the railroad alleges fraud and trickery on the part of the Canadian-New York Company in the operation of its motor coaches. According to the New York Central affadavits, tickets were sold in Syracuse and Utica, N. Y., for Albany and Buffalo on the understanding that the purchaser receive tickets marked for Pittsfield, Mass., Niagara Falls, Ont., and other points outside the state of New York, although according to the railroad's claim, the motor coaches of the independent were not operating outside of New York.

Independent Lines Merge

The Mason & Dixon Transit, Inc., with headquarters at Cincinnati, and capital of $2,000,000 has been organized to take over a number of Ohio and Kentucky motor coach lines, according to a recent dispatch from Cincinnati to the Wall Street Journal. Among the companies included in the merger are King Brothers Company, operating between Cincinnati and Dayton, Ohio, and other points in southern Ohio; the



Entrance to the New Pennsylvania Motor Coach Terminal at New York

Ohio Bus Lines Company, which operates between Cincinnati, Hamilton and Middletown, Ohio; the Blue Coach Lines, operating between Cincinnati, and Lexington, Ky.; the Dixie Coach Line, which operates through northern Kentucky; the Gold Seal Transit Company, operating through central Kentucky; the Inter Cities Coach Lines, which operates between Hayton, Piqua, Sidney and Troy, Ohio, and the Covington Interurban Bus Terminal with lines out of Covington and near-by cities.

Cotton Belt Receives Missouri Certificate

The Missouri Public Service Commission has granted the Southwestern Transportation Company, highway subsidiary of the St. Louis Southwestern, a certificate to operate motor coaches from Malden, Mo., to a point on the Missouri-Arkansas line near St. Francis, Ark.

Road-Rail Merger in England

Directors of the Crosville Motor Company, Ltd., British motor coach operator, have approved the joint offer of the London, Midland & Scottish and the Great Western to purchase its properties for £398,750 according to a recent announcement published in Modern Transport (London). The decision now awaits ratification by the Crosville Motor Company stockholders.

The Crosville Company operates over 1,250 route miles and its network of lines serves between 400 and 500 villages in North Wales. One of the latest additions to its service was a daily run bebetween Liverpool and London.

Motor Coaches Now Serve 18,000 British Communities

The United States Department of Commerce reports that there are at present 3,312 regular motor coach routes operating in Great Britain, linking more than 18,000 communities. In addition the report states there are 296 regular express motor coach lines between distant points and a great many seasonal services. The number of motor coach operating companies in England and Wales exceeds 6,000. The British railway companies, the report continues, have recently purchased or consolidated with 36 independent highway companies in England, Scotland and Wales and negotiations are now under way for the purchase of other lines by the railways.

Contract Truckers Not Subject to Florida Law

The Florida law placing motor coach and motor truck lines under the jurisdiction of the State Railroad Commission has been held unconstitutional insofar as the statute relates to contract truckers, according to a decision recently handed down in the Florida circuit court.

The case was a test suit brought by E. S. Smith, a truck operator who was charged with operating a truck and trailer over the public highways without having made application for a permit or without making a deposit to cover the mileage tax imposed by the act of the 1929 legislature. The suit grew out of a criminal proceeding against Smith, who, upon being bound over to the criminal court, instituted habeas corpus proceedings to bring the matter before the circuit court. Counsel for the truckman attacked the constitutionality of the statute claiming that the petitioner was a private carrier and not a common carrier. This view was upheld by the decision in the case. The decision held that it is beyond the power of the legislature to convert a truck operator into a common carrier by legislative fiat or to require a private carrier to assume the duties, burdens and obligations and become subject to the same rules as a common carrier.

Motor Transport Successful in West Africa

Motor transport activities of the Nigerian Railway were profitable during the year ending March 31, 1929, according to the annual report of the general manager of this West African system. Gross revenues from highway operations amounted to £24,556, or $119,342, expenses totalled £22,867, or $111,134, and there was a net profit, after all charges, of £1,031, or $5,011.

A total of 282,651 truck miles were run during the year, an increase of over 59,000 as compared with the preceding twelve months. Revenues and cost per mile were 20.84 and 19.42 pence, respectively.

The trucks in use are mostly 1½-ton hauling 3-ton trailers. The average daily run is between 100 and 135 miles. The tariff in use is a simple one, listing of but two classes of traffic—Class I, for which the rate is ninepence per ton mile, and Class II, for which one shilling is charged per ton mile. Traffic moving in full truckloads is carried at slightly lower rates. These rates are as cheap as the lowest form of animal transport, and results indicate that even low class freight can bear them for relatively long distances.

States Improved 29,252 Miles of Highway During 1928

A total of 29,252 miles of their highway systems was improved by the 48 states during 1928, according to figures compiled by the Bureau of Public Roads, U. S. Department of Agriculture. The figure represents an increase of 2,530 miles over 1927.

This 1928 figure includes 8,675 miles of graded and drained highways and 20,577 miles of new surfacing. Of this latter 13,843 miles were previously unsurfaced. The state of Texas leads all others in the number of miles improved during 1928, the figure being 2,356. Kansas was second with 1,785 miles and Arkansas third with 1,673 miles. At the close of the year the state systems totaled 306,442 miles of highway. Of this figure, 193,138 miles were surfaced, 31,755 graded and drained, and 81,549 miles were unimproved or partly graded. The 1928 figure of 306,442 miles is an increase of 13,090 miles over the 1927 total. During the year the states spent $764,648,134 for this state highway and bridge work under the supervision of their highway departments.

Orders for Equipment

THE SANTA FE TRANSPORTATION COMPANY has accepted delivery of one Type W Yellow parlor motor coach.

THE PICKWICK STAGES has accepted delivery of two Mack model BK, 265-in. motor coach chasses and two Mack model AL, six-cylinder, 232-in, motor coach chasses.

THE PACIFIC ELECTRIC COMPANY has accepted delivery of 10 urban type Twin coaches.

THE MISSOURI PACIFIC TRANSPORTATION COMPANY has accepted delivery of one A. C. F. 23-passenger parlor motor coach and one A. C. F. model 602 motor coach chassis.

THE READING TRANSPORTATION COMPANY has accepted delivery of five Mack model BK six-cylinder, 29-passenger parlor motor coaches.

Motor Transport Officers

J. C. Neph has been appointed purchasing agent and general storekeeper of the Pacific Transportation Securities, Inc., with headquarters at San Francisco, Cal.

W. A. Cather has been appointed assistant auditor of the Pacific Transportation Securities, Inc., Southern Pacific Motor Transport Company and California Transit Company, with headquarters at San Francisco, Cal.

C. R. Gindra has been appointed superintendent of operation of the Union Auto Transportation Company and the Pickwick Stages System, with headquarters at El Paso, Texas. He will have jurisdiction over territory extending from Douglas, Ariz., to El Paso and Safford, Ariz., to El Paso. **P. E. Beutke** has been appointed district manager, with headquarters at Phoenix, Ariz., with jurisdiction over the territory from Yuma to El Paso, Texas, inclusive. **Earl Standage** has been appointed superintendent of operation, with headquarters at Phoenix, Ariz., with jurisdiction over the territory from El Centro to and including Safford and Douglas, Ariz.

Among the Manufacturers

The Jaeger Watch Company has moved its office from 36 West Forty-seventh Street to 304 East Forty-fifth Street, New York City.

The Russell Manufacturing Company, Ltd., a subsidiary of the Russell Manufacturing Company of Middletown, Conn., has recently opened a Canadian plant at St. Johns, Quebec, Canada.